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## DISEASES CAUSED BY BACTERIA AND FUNGI

*KUNICKI-GOLDFINGER, W. (1939). Zakazne zapalenie wymion u krów i metody jego wykrywania. [**Bovine Mastitis Caused by *Streptococcus agalactiae* and Methods of its Detection**].—*Roczn. Nauk rol.* **46.** 65–88. [English summary]. [Abst. in *Dairy Sci. Abstrs.* **2.** 313–314, copied *verbatim*. Signed: J. Z. W.].

Individual quarter samples of the fore-milk from 177 cows in 21 herds were examined for macroscopic changes, pH, chloride and catalase contents and microscopically for streptococci and leucocytes. When two or more tests indicated mastitis, samples were plated on blood agar at 37°C. Forty-five cows were infected in 68 quarters; 75 per cent. of the isolated organisms were *Streptococcus agalactiae*. Agreement with the blood agar results was 64 per cent. for the catalase test, 60 per cent. for the leucocyte count (>500,000 per ml.), 34 per cent. for alkalinity (alizarol) and 23 per cent. for chloride content. A combination of chloride, catalase, leucocyte and alizarol tests, confirmed by plating on blood agar, gave the best results. Infection was more frequent in hind quarters than in fore quarters and in old cows than in young.

POU, M. C., VIERA, O. C., & CALZADA, V. (1937). Endocarditis ulcero-trombótica del perro por un estreptococo hemolítico. [**Endocarditis caused by a Haemolytic Streptococcus in a Dog**].—*An. Fac. Vet., Montevideo.* **3.** 7–10.

From a case of endocarditis in a dog the authors isolated a β-haemolytic streptococcus with the following characteristics:– It did not ferment insulin; did not grow in pure bile or in bile broth, but was not lysed by bile. It produced a slight pink colour in milk, did not liquefy gelatin, and did not clot milk. It acidified glucose, galactose, laevulose, maltose, lactose, xylose, and salicin without formation of gas, but did produce gas with saccharose. It was destroyed by heating at 60°C. for 20 min.

The organism was pathogenic for rabbits, g. pigs, and rats. Dogs were infected artificially, endocarditis being produced with various complications according to the age of the animal.

—MILLER WATSON.

KOCHI, M. (1940). **On the Influence of Glucosides on the Streptococcus and other Microorganisms.**—*Jap. J. exp. Med.* **18.** 95–103. [In English].

Cultivation of haemolytic streptococci in culture media to which various glucosides had been added resulted in the formation of a viscous bacterial mass and long chains of abnormal micrococci; the concentration of glucosides capable of causing such a change was near the bacteriostatic concentration. The glucoside "convallamarin" induced the most marked changes in the case of 16 strains of haemolytic streptococci, but produced no change in the case of five strains of green streptococci. It is suggested that it is possible to distinguish by this means the haemolytic streptococcus from the green streptococcus and

* NOTE:—In certain cases it is not possible to check references in the original publication. Such references are marked with an asterisk.

also from other types of micrococci except *Streptococcus pneumoniae* type IV which also forms long chains on the addition of glucosides; *Str. pneumoniae* types I, II, and III show only slight formation of chains. Addition of convallamarin caused abnormal growth of *Chromobacterium prodigiosum*, the appearance of hairy bacilli being noted. The haemolytic action of glucosides was investigated and it was found that there was a parallel relation between the appearance of abnormal growth of bacilli and the haemolytic action of the glucosides; the greater the haemolytic action of the glucoside the greater was the abnormal growth produced.
—R. ALLCROFT.

I. HOTTLE, G. A., LAMPEN, J. O., & PAPPENHEIMER, A. M., Jr. (1941). **Biotin as a Growth Factor for C203S Strain of Hemolytic Streptococcus, Group A. [Correspondence].**—*J. biol. Chem.* **137.** 457–458.

II. PORTER, J. R., & PELCZAR, M. J., Jr. (1941). **The Nutrition of Staphylococcus aureus. The Influence of Biotin, Bios $II_B$ and Vitamin H on the Growth of Several Strains.**—*J. Bact.* **41.** 173–192.

I. Biotin has been reported as an essential growth factor for several micro-organisms [see *V. B.* **11.** 423]. It is now demonstrated that biotin is an essential growth factor for the C203S strain of group A haemolytic streptococci. Maximum growth was obtained by the addition of 0·08 $\mu$g. of crystalline biotin per litre of medium.

II. It was found that various strains of *Staphylococcus aureus* grew much better in a glucose meat-infusion broth than in the basal synthetic medium of GLADSTONE [*V. B.* **8.** 199]. Quantitative measurement of growth was made by micro-Kjeldahl estimation of the amount of bacterial nitrogen. Also certain "fastidious" strains were unable to grow on continued subculture in Gladstone's medium. To investigate the nutritional requirements of these particular strains, the synthetic basal medium was supplemented with additional amino-acids and several important growth factors. It was found that in addition to vitamin $B_1$ and nicotinic acid these strains require the growth factor biotin; the optimal concentration of the biotin preparation was approximately 0·1 $\mu$g. per ml. of the synthetic medium [see also I].

Equally as good growth was obtained when the biotin concentrate was replaced with either bios $II_B$ or vitamin H. This supports the work of GYÖRGY *et al.* [*V. B.* **11.** 553] who suggest that biotin, vitamin H, and coenzyme R are possibly identical compounds. The manner in which these particular organisms respond to the addition of biotin, bios $II_B$, and vitamin H concentrates, suggests the possibility of using them for the bio-assay of these substances.

The growth of those strains whose nutritional requirements were satisfied by Gladstone's medium, was not stimulated by the addition of biotin, bios $II_B$, or vitamin H concentrates. Also there was no demonstrable influence on growth when the basal synthetic medium was supplemented with the growth factors riboflavin, pimelic acid, glutamine, vitamin $B_6$, inositol, pantothenic acid, cocarboxylase, cozymase, glutathione, uracil, guanine, adenine, adenylic acid, and adenosine triphosphate. It is suggested that if these substances are essential for growth, the organism can apparently synthesize them from the ingredients in the basal medium.—R. A.

BARNARD, W. G., & TODD, E. W. (1940). **Lesions in the Mouse Produced by Streptolysins O and S.**—*J. Path. Bact.* **51.** 43–47. [Authors' summary copied *verbatim*].

The tissues of mice killed by intravenous injections of streptolysins O and S and of living virulent and attenuated haemolytic streptococci have been examined microscopically. The following differences have been noted.

1. Streptolysin O caused no parenchymatous lesions and no visible intravascular haemolysis. The characteristics of this group were general venous engorgement and oedema of the lungs.

2. Streptolysin S caused degeneration of parenchymatous organs and general laking of blood throughout the body. This was particularly well seen in the heart, which contained no red blood cells.

3. Living virulent and attenuated cocci caused cloudy swelling of parenchymatous organs. There was very little evidence of intravascular haemolysis. The virulent cocci infiltrated the liver while the attenuated cocci were only seen on the surface of the capsule.

CHRISTENSEN, L. R. (1940). **Factors Influencing Streptococcal Fibrinolysin and Fibrinolysis.**—*J. infect. Dis.* **66.** 278–284.

Details are given of the preparation from human plasma of fibrinogen and prothrombin in the dry state by desiccation *in vacuo* over

$P_2O_5$. Methods for the preparation of fibrinolysin and the carrying out of lysis tests are also described. The lysis time of fibrin clots is increased with increasing fibrinogen concentration and the optimum temperature range is from 40°–47°C. Above 56°C. the fibrin clot is denatured and unsuitable for fibrinolysis. The optimum pH range for production of fibrin clots from fibrinogen and prothrombin is 7·0–8·0, but clots which will lyse with fibrinolysin will form between 5·8 and 9·5.

pH has little effect on fibrinolysin over a wide range and the heat stability of fibrinolysin is confirmed, although autoclaving at 15 lb. for 15 min. will completely destroy lysin activity. Fibrinolysin concentrated by vacuum distillation markedly loses its activity, although when desiccated *in vacuo* over $P_2O_5$ it loses little or none of its activity. Fibrinolytic filtrates may be stored in the refrigerator for a month without gain or loss of activity.—A. EDEN.

FARRELL, L. N., & KITCHING, J. S. (1940). **Passive Protection of Mice With Immune Horse Serum Against Living Staphylococci.**—*J. Path. Bact.* **50.** 439–453. [Authors' summary copied *verbatim*].

1. Sera prepared by injection of two horses with washed formalinised vaccines made from two toxigenic strains of staphylococci protected mice against experimental infection with approximately 5 average lethal doses of the homologous culture. Protection was not obtained with either serum against this dose of the heterologous strain.

2. One of these sera protected against 5 A.L.D. of one of 4 other heterologous strains tested; the other afforded some protection against another of these strains.

3. The $\alpha$ antitoxin titre was found to be a poor index of the protective capacity of these sera.

4. The protection obtained with these sera was independent of the antileucocidin titre as measured by the method of Valentine.

5. Absorption of agglutinins from one serum showed that the protection was not dependent upon these antibodies.

PARFENTJEV, I. A., CLAPP, F. L., & WALDSCHMIDT, A. (1941). **Staphylococcal Toxoid Prepared by Peptic Digestion.**—*J. Immunol.* **40.** 189–199.

Staphylococcal toxin when subjected to mild peptic digestion at pH 4·2 was found to be completely detoxified; control batches of the same toxin subjected to identical conditions without the pepsin lost none of their original potency. This detoxified toxin possessed a marked antigenic property for human beings and animals. Under specified conditions the toxin after peptic hydrolysis showed no detectable capacity for combining with specific antitoxin. A solution of digested staphylococcal toxoid, injected intracutaneously caused distinctly less local reaction in human beings, when compared with a formolized toxoid containing only one-tenth of the quantity of antigenic substance.—ALFRED EDEN.

JACKSON, S. H., NICHOLSON, T. F., & HOLMAN, W. L. (1940). **Carbohydrate Metabolism and Staphylococcus Infection in Rabbits.**—*J. Path. Bact.* **50.** 1–9.

Glucose tolerance tests carried out on rabbits fed a high carbohydrate diet showed that such animals have a decreased tolerance compared with normal rabbits. Experimentally induced staphylococcal skin infections in these rabbits were better localized, with swelling and little superficial necrosis, whereas in rabbits on a normal diet little swelling and a spreading necrotic area resulted from similarly induced infections. The localized infections increased the tolerance for glucose, but with the spreading type of necrosis there was a decreased glucose tolerance. This suggests that the decreased tolerance may be due to the absorption of toxin rather than to the necrosis *per se*.—A. EDEN.

STERNE, M. (1939). **The Use of Anthrax Vaccines Prepared from Avirulent (Uncapsulated) Variants of *Bacillus anthracis*.**—*Onderstepoort J. vet. Sci.* **13.** 307–312.

Preliminary tests carried out with this avirulent vaccine under laboratory conditions showed that the vaccine maintained its efficacy after storage for one year. The method of preparation is described. In a very extensive series of field tests carried out between 1936–39, the vaccine gave as good results as the ordinary spore vaccine. The use of the avirulent vaccine on equines and sheep was very successful. In goats a small mortality was encountered (1%) as a result of the inoculation, but the goats did not show anthrax septicaemia. The avirulent vaccine has therefore not been made a routine issue for goats. Since 1938, saponin has been added in the proportion of 0·5% without any loss of efficacy.—E. M. ROBINSON.

STERNE, M. (1939). **The Immunization of Laboratory Animals against Anthrax.**—*Onderstepoort J. vet. Sci.* **13.** 313–317.

In a series of experiments on g. pigs and mice it was found possible to produce a strong immunity with an uncapsulated avirulent strain of *Bacillus anthracis*. Some degree of immunity was present 24 hours after inoculation. G. pigs developed a stronger immunity than mice. This was not due to the greater susceptibility of mice to anthrax, as repeated tests showed that they were less susceptible than g. pigs. The test dose used in the experiments was 100 M.L.D. of a Pasteur II strain.—E. M. R.

I. WIGHT, A. E. (1940). **The General Tuberculosis Situation.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 106–114.

II. FAULDER, E. T. (1940). **Reaccreditation of Modified Accredited Counties in the State of New York.**—*Ibid.* pp. 133–137.

I. In the modified accredited area during the year ended June 30th, 1939, 10,000,000 tuberculin tests revealed about 33,000 reactors. In California, the only state not wholly accredited, initial testing of all animals was completed. The Virgin Islands attained accredited status in December, 1938, and all municipalities of Puerto Rico in January, 1939. During the year 195,000 cattle were tested prior to inter-state shipment. Only 22 reactors were disclosed.

Avian TB. continued to be prevalent specially in Central and North Central States. Of 98,000 flocks examined, 3,300 were infected. Tuberculin tests of swine revealed a higher percentage of reactors to avian tuberculin than to mammalian.

During the year, 9,500,000 cattle were slaughtered under Federal supervision. Apart from known reactors to the tuberculin test, about 10,000 showed signs of TB. Of these only 2,400 were condemned as unfit for food. Of 38,600,000 swine slaughtered during the same period 3,400,000 showed evidence of the disease. Only 28,000 of these were condemned.

Johne's disease was reported from 16 different states and 3,560 cattle were tested during the year. Of these 321 were classified as reactors.

II. Since 1930 the New York State Legislature has made annual appropriations to allow for re-testing of accredited herds. Re-testing is undertaken by a panel of 400 veterinarians.

Systematic re-testing of accredited herds has materially reduced both the number of reactors and the percentage of infected herds. Whenever a herd becomes infected, double intradermal tests are applied at regular intervals until it is clean again. Doubtful animals and occasionally others are re-tested by the short subcutaneous method.

Funds are not sufficient to permit a complete re-test of all accredited herds each year. During 1939, all herds of eight cattle or over in 14 counties where previously infection ranged from 38–53% were re-tested. The smaller herds are to be re-tested every three years. In all other counties re-testing is done on a two-year basis.—D. D. OGILVIE.

NOORDIJK, E. (1939). Tien jaren tuberculosebestrijding onder het rundvee op het eiland Texel, met rijkssteun. [**Ten Years' Control Work on Bovine TB. on Texel Island**].—*Tijdschr. Diergeneesk.* **66.** 1195–1208.

Texel being a relatively small island, conditions are favourable for the control of TB. Under the direction of veterinary officers an association was formed among the town council, the breeders, and the milk factories. Between 1929–39 the number of members increased from 153 to 412; the number of cattle examined annually increased from 1,971 to 4,675; the number of reacting animals decreased from 316 to 38, and cases of "open lesions" decreased from 25 to 4.

Veterinary regulations, revised in 1934, included inspection and tuberculin testing of imported cattle, and, once a year, of all the cattle on the island, and slaughter of cases of open TB., compensation being paid to the owners. Reactors to the tuberculin test were removed from the island. The breeders' association was maintained by subscriptions of the members and subsidies granted by the State. Compensation paid reached 16,280 florins. Texel was then practically free from TB., a position which could be maintained under the existing regulations.—L. TOBBACK.

DE VINK, L. P. H. J. (1937). Tuberkulose der Placenta des Menschen und des Rindes im Hinblick auf das Vorkommen der kongenitalen Tuberkulose. [**TB. of the Human and Bovine Placenta and the Origin of Congenital TB.**].—*Arch. Gynaek.* **164.** 522–542.

Congenital TB. is not uncommon in calves but is extremely rare in man. The author attempts by a review of the literature and a histological study of a case of tuberculous endometritis and infection of the foetus in a cow to explain the strikingly lower incidence in women. In cows the tuberculous lesions are

predominantly exudative in character with necrosis of extensive areas of the uterine mucosa and overlying chorionic villi. The large number of cotyledons probably prevents abortion in the great majority of cases and thus the incidence of congenital TB. in proportion to uterine infection is high. In the human uterus the lesions are mainly proliferative with little tendency to caseation. Reactive changes occur in the chorionic villi which tend to prevent extension of the tuberculous process; during the first five months of pregnancy there is considerable danger of abortion occurring.
—E. G. WHITE.

GERNEZ, G. (1939). Rôle du bacille bovin dans la tuberculose humaine dans le nord de la France. [**Role of the Bovine Bacillus in Human TB. in Northern France**].—*Rev. Tuberc., Paris.* **5.** 326–332.

G. found only three definitely bovine strains of *Mycobacterium tuberculosis* out of 476 samples examined from human cases, but five other strains dysgonic at the time of isolation subsequently became eugonic and virulent for rabbits after successive cultivation on glycerin; G. questions whether these were eugonic bovine strains or human strains abnormally virulent for rabbits.

From these results he concludes that bovine type infection in man is less common in northern France than in other countries, and he attributes this to the advice not to give unboiled milk to young children; investigation has shown that 5·33% of market milk in northern France contains tubercle bacilli.

KAYSER-PETERSEN, J. E., & SPIEGEL, A. (1938). Ueber einen Fall von Affentuberkulose und über "Umgebungsuntersuchungen" bei Affen. [**A Case of TB. in a Monkey and "Environmental Investigations" in Monkeys**].—*Beitr. Klin. Tuberk.* **92.** 195–201. [Abst. from authors' summary].

A case of TB. terminating fatally was observed in a Java macaque; it is very probably traceable to the exacerbation of a primary focus through pregnancy.

Two of her progeny which lived in close contact with the sick animal, and were 16 and two months old respectively when the mother died, were kept under observation until they were 3¾ and 2½ years old respectively. Definite illness did not appear, and it could not be established with certainty whether infection developed, because tuberculin tests are unreliable in monkeys. X-ray examination showed the probable development of a calcified primary complex in the older animal. It is suggested that infection may be avoided by adequate sanitation and care in maintenance of these animals.

VERA, H. D., & RETTGER, L. F. (1940). **Morphological Variation of the Tubercle Bacillus and Certain Recently Isolated Soil Acid Fasts with Emphasis on Filtrability.**—*J. Bact.* **39.** 659–686.

A careful examination of three human and three bovine strains of tubercle bacilli together with nine strains of soil acid-fast bacilli failed to reveal any evidence that filtrable forms exist.

By micro-culture technique it was observed that transverse fission was the normal method of reproduction. After division the daughter cells remained in line. Later they formed angles with one another, obtuse at first, subsequently acute until the two cells came to lie parallel. Branching was observed to occur occasionally.

Variant forms, *viz*, swollen clubs, spore-like globoid forms, and granular bacteria were readily induced by the use of media of poor nutrient value or by reducing the oxygen tension. The gross morphology of colonies was altered under similar conditions. They lacked pigment, grew more or less smoothly, were less raised, and were more spreading.

Vertical sections of colonies stained by Gram and Ziehl-Neelsen techniques generally showed that the colonies were stratified, having an outer non-acid-fast or Gram-negative layer and an inner acid-fast or Gram-positive stratum, but this was not constant. There was no evidence to enable it to be assumed that non-acid-fastness was associated exclusively with very young cells on the one hand or mature or very old cells on the other.—J. S. PATERSON.

SCHLEMPER, P. (1939). Onderzoekingen over filtreerbare vormen van den tuberkelbacil. I. De filtreerbare vormen van den tuberkelbacil. [**Investigations on Filtrable Forms of *Mycobacterium tuberculosis*. I**].—*Meded. v.d. Prof. Dr. D. A. de Jong-Stichting, Utrecht.* No. 3. pp. 1–65. [English, French and German summaries].

TEN THYE, J. H. (1939). Onderzoekingen over filtreerbare vormen van den tuberkelbacil. II. Microscopisch patholo-

gisch anatomisch onderzoek van organen van caviae, behoorende tot de proefreeksen beschreven door Dr. Schlemper [**Investigations on Filtrable Forms of** *Mycobacterium tuberculosis*. **II. Pathological Changes in G. Pigs**].—*Ibid.* pp. 66–79.

[Abst. from abst. in *Bull Hyg., Lond.* **15.** 137. Signed: H.H.S.]

I & II. The authors studied various filtrable extracts of the tubercle bacillus with and without acetone extracts and were not able to demonstrate any such elements.

NAG, P. C. (1938). Untersuchungen über Johne'sche Krankheit (Paratuberkulose) (besonders Kulturversuche, Allergie, Serodiagnostik, Immunität). [**Research on Johne's Disease**].—*Inaug. Diss., Munich.* pp. 55.

N. speaks of the extraordinarily rapid spread of Johne's disease in India.

The organisms used in this work comprised ten strains from Hanover, eight from Alfort, and one from Cambridge, as well as two strains from sheep. The bacilli were cultivated on Sauton's medium, with and without the addition of an extract of *Mycobacterium phlei*, and johnin was prepared from cultures on these media by the method recommended by VALLÉE & RINJARD. The johnin was tested by intradermal injection in three goats infected by the subcutaneous injection of 25 mg. of culture, and was then used on 250 cattle in three French provinces, the intradermal test being made in the skin of the neck or caudal fold, or in both sites.

Examination of faeces after antiformin treatment, or of small portions of rectal mucosa, was of little value in diagnosis. This is clearly shown in the tables (35% positive).

The complement-fixation test was tried, using an antigen prepared from cultures or from naturally infected material. A positive reaction was obtained in 20 of 28 samples from reactors to the johnin test.

N. carried out, in 216 animals, the method of producing immunity adopted by VALLÉE & RINJARD. Subcutaneous nodules developed in 178, whilst the remaining 37 animals failed to react [figures discrepant in original article]. No observations are recorded as to the protection, if any, conferred by the injection.

Of the 250 cattle tested with johnin, 62 gave a positive reaction, no reactor being younger than 18 months. A single case of co-existent TB. and Johne's disease was encountered at Hanover.—E. G. WHITE.

DIJKSTRA, J. M., KOOISTRA, R., & VAN DER LAAN, K. (1939). Epidemiologische gegevens over vlekziekte. [**Epidemiology of Swine Erysipelas**].—*Tijdschr. Diergeneesk.* **66.** 1264–1278.

This is a report by a commission of enquiry of the Veterinary Association into S.E. in Friesland. The disease and its causal organism are systematically described and its incidence in 1936 and 1937 is reviewed with regard to daily, weekly, and monthly outbreaks recorded, the local pig population, local types of pig husbandry (extensive or intensive, etc.), climate and atmospheric temperature, and the previous application or non-application of preventive inoculation.

The data assembled are mainly of local interest only, no new knowledge being obtained about control of the disease.—L. TOBBACK.

LOBEL, L. W. M., VAN DER SCHAAF, A., & ROZA, M. (1939). Biologische mitigatie van malleusbacillen op rundergalhoudende voedingsbodems. II. Infectieproeven bij cavia's (tweede serie) en bij paarden. [**Biological Attenuation of the Glanders Bacillus on Ox-Bile Medium. II. Tests on G. Pigs and Horses**].—*Ned.-ind. Bl. Diergeneesk.* **51.** 359–370. [Abst. from English summary]. [For part I, see *V. B.* **4.** 458].

Three strains of *Pfeifferella mallei*, grown on ox-bile potato media for 11 years to 456 generations, were virulent for g. pigs and only slightly virulent for horses. When large doses were given to horses the strains retained their virulence at the site of inoculation for at least 30 days, without their virulence for g. pigs being increased. The antigenic properties of the strains were weak.

I. ITIKAWA, O. (1940). **On the Relation between the Mallein Reaction and the Morphological Changes in 300 Cases of the Glanderous Lungs of Mongolian Range Horses.**—*Jap. J. vet. Sci.* **2.** 195–236. [In Japanese: abst. from English summary].

II. ITIKAWA, O. (1940). **Relationships between Morphological Changes and Mallein Reactions in 300 Mongolian Horses with Spleen Lesions of Glanders.**—*Ibid.* 277–300. [In Japanese: abst. from German summary].

III. ITIKAWA, O. (1940). **Relationship between Nasal Lesions of Glanders and Mallein Reactions in 300 Mongolian Horses Dead of Glanders.**—*Ibid.* 301–320. [In Japanese: abst. from German summary].

I. The author records a detailed analysis of results of pathological studies on 300 cases selected from 886 cases of glanders in Mongolian range horses. Clinical examinations, mallein, agglutination, and complement-fixation tests and autopsies were conducted. The present observations represent an endeavour to link up the results of the mallein reaction with the actual lesions found. Mallein reactions are graded as +++, ++, +, ±, and –.

Lesions were observed in several cases when the mallein reaction was — or ±. 285 cases showed glanders nodules in the lungs, there being complete encapsulation in 199 cases. 181 cases showed oedema of the lung, while glanderous broncho-pneumonia was seen in 132 cases. Cavitation was seen in 31 cases and hepatization in 97. In general, glanderous changes in the lungs occurred in 99·3% of cases. Nodules were generally on both mediastinal and costal surfaces of the lung but were usually more numerous on the mediastinal surface. In 86% of cases nodules were found in both lungs. Animals giving a +++ reaction showed small numbers of nodules, those giving ++ or + reactions had numerous nodules, while ± or – reactors had either very small numbers or very large numbers. Where +++ reactors were found, nodules varied from the size of a millet grain to that of a pea (haematogenous infection), or were walnut sized or larger (bronchogenous infection). In ± or – reactors nodules were generally small and showed signs of progression; some, however, showed very large nodules. Calcified lesions were common in lungs of + reactors, and appeared in a few cases where reactions were ± or –. Caseation was seen most frequently in + and ++ reactors, while young nodules appeared principally when reactions were ++. It is suggested that with the progression of nodules from the young stage to caseation, the reaction passes from ++ to +++, then becomes ++ later, with calcification dropping to +, and finally to ± or –.

Tables are included summarizing the various types of lesion seen in correlation with the intensity of the reaction to mallein.

II. The author details the results of studies of glanders spleen lesions. Splenic lesions were observed in 142 out of the 300 cases recorded. In 85% of cases nodules in the spleen were few (2 or 3). Other cases showed up to 27 nodules. Splenic nodules were observed in 18 cases where the mallein reaction was doubtful or negative. Nodules were generally superficial, were raised above the surface of the capsule, and were sharply defined. Small miliary nodules were most frequently found, though in some cases nodules were as large as hen's eggs. When nodules were very large there was usually a gross enlargement of the spleen. In 81 cases nodules were caseous, in 32 calcification had occurred, while in 37 fresh nodules were seen. Encapsulation of nodules was seen in 101 cases. Splenic enlargement was observed in 216 of the 300 cases and was rather more frequently found in +++ reactors and in – reactors to the mallein test. When splenic enlargement was very marked, nodules were generally absent, while in cases where no swelling occurred they were usually present.

III. The author describes the nasal lesions seen in 151 of the same 300 cases. Of these the mallein reaction gave the following results:– +++ in 22 cases, ++ in 53 cases, + in 67 cases, ± in 8 cases, and – in one case.

Nasal ulcers were seen in 51·4% of cases, nodules in 27·7%, and scars in 20·9%. The three types of lesion occurred together in only 24 cases, in most cases one type only being seen. A table details the intensities of the mallein reactions along with the intensity of the three types of lesion. No very clear conclusions can be drawn from the figures given, though there is some suggestion that the intensity of the mallein reaction falls as the nasal lesions progress.

Since 99% of cases had lung lesions, while only 50% had nasal lesions, it is inferred that the latter may be secondary to the lung lesions. A purulent nasal discharge was apparent in 65 cases, 48 of which had nasal lesions. It was more commonly associated with the ulcer type of lesion. Some attempt is made to correlate the changes seen with the state of allergy as expressed by the mallein reaction, but the conclusions drawn are not convincing.

—H. E. HARBOUR.

NISI, T., & SIBUYA, Y. (1940). **Studies on the Antigen of *Pfeifferella mallei*. I. Observation on Reaction Zone Determined by the Antigen-Antibody Union in Complement-Fixation Tests.**—*Jap. J. vet. Sci.* **2.** 139–154. [In Japanese: abst. from English summary].

In c.-f. tests for glanders, two different reaction zones were observed depending on the quantitative relationships of antigen and antibody. Schütz and Schubert's *P. mallei* antigen was used, and one phase known as the A phase showed a prozone phenomenon when the antigen was in excess, the maximal c.-f. reaction occurring with decreased doses of antigen. In the B phase the reverse appeared to occur, maximal c.f. taking place with large doses of antigen. Sera from naturally infected horses show only the A phase, whereas sera from rabbits being immunized experimentally show the B phase at first and later the A phase also. It is important to bear these points in mind in the serological diagnosis of glanders.

—GWILYM O. DAVIES.

LANGNER, P. H., Jr., FORRESTER, J. S., & LANGNER, F. W. (1941). **Comparative Immunologic Response in Rabbits Following the Injection of Heat-Killed Pasteurella avicida by Several Routes and of Sonic Disintegrated P. avicida Intracutaneously.**—*J. Immunol.* **40.** 153–159.

Fifty-six young rabbits were divided into seven groups of eight each. Five groups were each injected with heat-killed bacterial suspension by different routes, *viz*, intracutaneously into the back, intracutaneously in the thigh region, subcutaneously in the back, subcutaneously into the thigh, and intravenously. The sixth group received a Berkefeld filtrate of a bacterial suspension submitted to high frequency sound vibration, and the seventh group served as a control.

Of the five routes of injection the intravenous gave the best agglutinin response and the best degree of resistance. There was little to choose between the others. The filtrate of *P. aviseptica* disintegrated by sonic vibration was a poor antigen.

Intracutaneous tests to determine the degree of allergy present revealed little significant difference in sensitization between the various routes of injection.—GWILYM O. DAVIES.

WEBB, J. F., Jr. (1939). **The Rôle of Clasmatocytes in Resistance of Rabbits to Infection with** *Pasteurella lepiseptica*.—*J. Immunol.* **37.** 261–282. [Author's summary copied *verbatim*].

1. Mononuclear (clasmatocyte) accumulations, obtained by seventy-two hour pleural cavity preparation with aleuronat and starch, were definitely correlated with enhanced resistance of rabbits to intrapleural infection with *Pasteurella lepiseptica*.

2. Polymorphonuclear accummulations, obtained by eighteen hour preparation of the pleural cavity with the same irritant, had slight effect on enhancing the resistance of rabbits to intrapleural infection with *Pasteurella lepiseptica*.

3. Specific immune serum injected intrapleurally into normal rabbits together with an infecting dose of *Pasteurella lepiseptica* had a definite protective effect, but was not as effective as local mononuclear accumulations. Normal serum so applied appeared to be without protective effect.

4. The passive intrapleural transfer of seventy-two hour pleural exudate, either alone or followed by immune serum given intravenously, failed to protect normal rabbits against approximately one hundred fatal doses of *Pasteurella lepiseptica* administered simultaneously.

5. Following the intravenous injection of specific immune serum, in quantities alone unable to protect, the intrapleural administration of cell-suspensions from seventy-two hour exudates (clasmatocyte type) was superior to cell-suspensions from twenty-four hour exudates (polymorphonuclear type) in protecting normal rabbits against approximately one hundred fatal doses of *Pasteurella lepiseptica* given simultaneously.

HENNING, M. W. (1939). **The Antigenic Structure of Salmonellas obtained from Domestic Animals and Birds in South Africa.**—*Onderstepoort J. vet. Sci.* **13.** 79–189.

Using the most modern technique for the determination of salmonella species, H. describes his work on 318 salmonella strains isolated by him from domestic animals and birds in South Africa. It was found that biochemical tests alone could not be relied upon for identification although they were very useful. Reliance could only be placed on antigenic analysis by carefully planned serological tests. After dealing with the history of the development of the serological technique now used in identification of salmonellas, H. describes the methods he employed.

Salmonella infections in calves were in almost all cases due to *S. enteritidis* var. *dublin*. Only two strains were met with in sheep, one of which constituted a new species, *S. onderstepoort*, and the other was *S. typhi-murium*. A

number of strains of *S. cholerae-suis* were isolated from outbreaks of febrile septicaemic conditions in pigs, not associated with swine fever. An organism isolated from a case of purulent arthritis in a foal was identified as *S. typhi-murium* var. *copenhagen*.

In birds, salmonella species were isolated from fowls, geese, turkeys, ducks, pigeons and canaries, most of the material being obtained from the large number of cases sent in for diagnosis at Onderstepoort. Amongst these a new species was encountered in a fowl and given the name *S. amersfoort*.—E. M. R.

HENNING, M. W., & HAIG, D. (1939). **Serological Variants of *Salmonella typhi-murium* Isolated from South African Animals.**—*Onderstepoort J. vet. Sci.* **13.** 293–306.

Outbreaks of *S. typhi-murium* are described, three in pigeons, one in foals, and one in calves. Except for one outbreak in pigeons the causal organisms were lacking in the O factor V. Carriers were detected amongst the pigeons. These only showed O agglutinins, no trace of H being found. At autopsy the female birds showed oophoritis. In the calves a mixed bacterial infection was found, and it is probable that *S. typhi-murium* was a secondary invader. In the case of joint infection in a foal it is probable that this organism was responsible for the lesions. In spite of the serological identity of all except one strain, there were differences in their biochemical reactions and none gave the reactions associated with the Copenhagen or Storrs varieties of *S. typhi-murium*.—E. M. ROBINSON.

GALLO, P. (1939). La paratifosis de los terneros en Venezuela. [**Calf Paratyphoid in Venezuela**].—*Rev. Med. vet. Parasit., Caracas.* **1.** 34–49.

G. studied a number of cases of paratyphoid in calves and identified *S. enteritidis* var. *dublin* as the principal pathogen. In a few cases the causal agent was *S. typhi-murium* or *S. paratyphi B*.

The rest of the paper is devoted to a description of the symptomatology, pathology, and prophylaxis of the disease, no new knowledge being contributed.—MILLER WATSON.

HORMAECHE, E., & SALSAMENDI, R. (1939). El cerdo normal como "portador" de salmonelas. [**Normal Pigs as Carriers of Salmonella**].—*Arch. urug. Med.* **14.** 375–387. [Also appeared in *Bol. mens. Direcc. Ganad., Montevideo.* **23.** 147–160. (1939)].

From the mesenteric lymph nodes of healthy pigs the authors isolated 85 strains of salmonella, *viz*, 25 *S. derby*, 19 *S. typhi-murium*, 13 *S. newport*, 12 *S. anatum*, 4 *S. bredeney*, 4 *S. montevideo*, 2 *S. chester*, 2 *S. paratyphi B*, 1 *S. cholerae-suis* var. *kunzendorf*, 1 *S. newington*, 1 *S. london*, and 1 *S. muenchen*.

The authors comment on the fact that only one strain of *S. cholerae-suis* was isolated.

—MILLER WATSON.

FREEMAN, G. G., CHALLINOR, S. W., & WILSON, J. (1940). **The Use of a Synthetic Medium in the Isolation of the Somatic Antigens of *Bact. typhi-murium* and *Bact. typhosum*.**—*Biochem. J.* **34.** 307–324.

Chemical extractions were made of the antigenic fractions of *Salmonella typhi-murium* and *S. typhi* by three methods after the organisms had been grown on a liquid medium containing only inorganic salts and glucose. The methods were :– (1) the tryptic digestion technique of RAISTRICK & TOPLEY (1934); (2) Boivin's method of cold extraction with trichloroacetic acid, and (3) extraction with the organic solvents ethylene glycol and diethylene glycol. The products were compared chemically and by mice toxicity determinations and the purest of these, obtained from the organisms free of any contamination with the culture media, show a very close similarity in properties. It thus appears highly probable that any of these methods leads to isolation of the essential antigenic complex of the bacteria in a state approximating to chemical homogeneity.

The first two methods are recommended when it is desirable to use large quantities of bacteria for extraction and when the highest yields are required. A method for the estimation of the galactose content of bacterial bodies and antigenic fractions has been further elaborated and is very useful when it is desired to determine the degree of agar contamination of the fractions when the bacteria are grown on agar media.

More detailed work is contemplated on the chemical fractionation of the various antigenic fractions thus prepared in bulk.—ALFRED EDEN.

GAUGER, H. C., GREAVES, R. E., & COOK, F. W. (1940). **Paratyphoid of Pigeons.**—*Tech. Bull. N.C. agric. Exp. Sta.* No. 62. pp. 71.

This paper comprises serological, bacterio-

logical, and haematological studies of pigeons spontaneously infected with *Salmonella typhimurium* var. *binns*. During the epizootic the squab mortality approximated 15%, the majority dying before they were three weeks old. There was also a slight mortality in adult birds.

During a 22-month period following this outbreak, four groups of birds were studied and it was found that squabs infected at an early age were not proficient in producing an antibody response, with the result that the organism was recovered from birds repeatedly negative to tube agglutination tests. It was also noted that the organism was not always recovered from birds consistently positive to the test, but it was isolated from two eggs laid by a positive reactor. Haematological examinations failed to distinguish between chronic carriers and non-infected birds.

—GWILYM O. DAVIES.

I. WIGHT, A. E. (1940). **The Present Status of the Federal-State Bang's Disease Program.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 28–35.

II. SHORT, R. E. (1940). **Bang's Disease Control from the Standpoint of the Animal Breeder.**—*Ibid.* 35–38.

III. HENDRICKS, W. H. (1940). **Problems Arising in Bang's Disease Control in the Western States.**—*Ibid.* 38–55.

IV. —. (1940). **Report of the Committee on Bang's Disease.**—*Ibid.* 67–69.

I. The Federal Government of the U.S.A. continues to conduct the Bang's disease programme on a voluntary basis. In some States, however, compulsory testing of all animals over six months old is required by the local authority. During 1939, 7,600,000 cattle were tested. The number of reactors disclosed was 219,165. All antigen used in the tests was produced and standardized by the Bureau of Animal Industry. Satisfactory uniformity was attained.

Studies in immunization have been continued with promising results. Some 13,000 calves, 4–8 months old, have been treated since 1936. Of these approximately 2,950 have completed their first gestation, about 625 their second, and about 60 their third.

Arrangements have now been made to certify both herds and counties practically free from the disease. In this connexion about 55,000 herds containing 1,100,000 cattle and some 200 counties with a disease incidence of less than 1% of the total cattle population have been certified.

II. Experiences in a herd in Arkansas are quoted to show the beneficial effects of the programme. An original test in 1934 showed 123 negative, 55 doubtful, and 25 positive reactors. Retests in July and October 1935 showed 16 doubtful and 42 positive reactors, and two doubtful and 12 positive reactors respectively. Doubtfuls and positive reactors were then eliminated. Further retests in December 1935, April 1936, and November 1937 showed one positive reactor, two doubtful and four positive reactors, and seven positive reactors respectively. In April 1937 and again in October 1938 all animals were negative.

Since testing was undertaken, the percentage of calves has risen from 60 in 1934 to 98 in 1937.

III. In certain parts of the country practical difficulties have arisen in carrying out the programme. This is especially so in Utah and similar areas where large numbers of cattle are on open range and it is impossible to avoid intermingling of herds. In these localities owners are often unwilling to co-operate because of the difficulties in handling their animals and the frequent reappearance of disease in the herds even after reactors have been eliminated.

Since 1934 about 39,000 herds have been tested in Utah. Approximately 18% were infected.

It is suggested that the difficulties encountered in range cattle could be overcome by widespread adoption of calfhood vaccination. Since 1934, 467 calves have been vaccinated in Utah. Of these only 2·6% subsequently became reactors when exposed to infection.

IV. Proposed regulations for setting up accredited Bang's disease free areas have been formulated. They resemble those set out for the control and elimination of TB.

Cattle from free herds or areas can enter accredited areas without retesting. All others except those intended for immediate slaughter are isolated and must pass two official agglutination tests at 30 and 60 days respectively.

With the exception of steers all cattle within the area over six months old must be tested. All reactors in dilutions of 1 : 100 or over must be slaughtered within 15 days, and the premises disinfected within another 15 days. Milk from reacting animals must be pasteurized.

If the number of reactors does not exceed 1% of all animals nor 5% of herds the area is

accredited for three years provided that all infected herds are isolated and retested at intervals of 30–90 days, until two consecutive negative results have been recorded.

After three years the area is re-accredited if not less than 10% of all herds are retested and the number of reactors does not exceed 1%. The renewal test must include all herds which contained reactors at the last complete area test or county check test.—D. D. OGILVIE.

KING, R. O. C. (1940). **Brucella Infection in the Bull: A Progress Report of Mating Experiments with Naturally Infected Bulls.**—*Aust. vet. J.* **16.** 117–119.

Three bulls which showed serological and clinical evidence of *Br. abortus* infection were used in experiments to determine whether they would infect cows which they served. Each cow was served twice, semen was collected from the vagina for examination, and the cow was then served again four times. The semen from two of the bulls contained *Br. abortus*. Four cows were served by each bull. All but one conceived and calved normally. Serological and cultural tests carried out on the cows revealed no evidence that they had become infected.

—W. I. B. BEVERIDGE.

D'ALESSANDRO, N. V. (1936). La infección brucelosa en los ganados argentinos destinados al consumo. [**Brucellosis in Argentine Cattle Intended for Human Consumption**].—*Folia biol., B. Aires.* Nos. 56–60. pp. 245–246.

Blood agglutination tests were made on 2,000 animals. All of 100 sheep had a titre of 1 : 25, regarded as negative; 42 (3%) of 1,400 bullocks gave a doubtful reaction at 1 : 50, and 72 (14·4%) of 500 cows showed a positive reaction at 1 : 100 or higher.

HAGEMAN, P. O., & DOUBLY, J. A. (1940). **Variation in Immune Response to** *Brucella abortus* **Depending on Route of Administration.**—*Proc. Soc. exp. Biol., N.Y.* **45.** 801–802.

The authors investigated the problem of whether the ingestion of milk containing brucella organisms killed by pasteurization stimulates the formation of agglutinins. The experiment was carried out on rabbits, which received heat-killed *Br. abortus* in milk by stomach tube at daily intervals for some weeks; no agglutinins could be demonstrated and it was concluded that the antigen is either not absorbed or is so altered by digestive processes that it loses its antigenicity. Organisms from the same culture injected intravenously produced positive results.

*BOSCH'JAN, G. M. (1939). **The Chemistry of the Brucella Group.**—*Ber. Allruss. Akad. Wissenschaften.* No. 10. pp. 41–44. [In Russian]. [Translation of abst. in *Zbl. Bakt. I. (Ref.).* **138.** 367–368].

Dying brucella organisms poison the animal body by their decomposition and so cause illness. Dehydrated and defatted brucella consist of about 70% protein and 29% nucleic acid. Total N comprises 13·43% (as $NH_3$ 5·21%), purine bases 8·19%, pyrimidine bases 9·09%, diamino acids 37·29%, monoamino acids 35·56%, and N in insoluble humin [dark-coloured nitrogenous substance formed during the hydrolysis of proteins by acids] 4·47%. The P content is 2·5%. Dehydrated and defatted brucella organisms constitute a specific allergen.

I. KELLAWAY, C. H., TRETHEWIE, E. R., & TURNER, A. W. (1940). **Neurotoxic and Circulatory Effects of the Toxin of** *Cl. welchii* **Type D.**—*Aust. J. exp. Biol. med. Sci.* **18.** 225–252.

II. KELLAWAY, C. H., TRETHEWIE, E. R., & TURNER, A. W. (1940). **The Liberation of Histamine and of Adenyl Compounds by the Toxin of** *Cl. welchii* **Type D.**—*Ibid.* 253–264.

I. Intravenous injection of slightly more than 1 M.L.D. of toxin in lambs produced convulsions due to direct action on the central nervous system. These doses had no early effects on the circulation. Death occurred either by failure of respiration or by cardiac failure complicated by oedema of the lungs, by pleural and pericardial effusions and by anhydraemia.

In rabbits, doses of about 1 M.L.D. were also without immediate effect on the circulation. The early clinical symptoms were ataxia and loss of muscular tone and were probably central in origin. Doses of 10 M.L.D. caused immediate cardiac embarrassment from which there was recovery by output of adrenalin through splanchnic stimulation and by peripheral vaso-constriction. Death in both cases was by oedema of the lungs and cardiac failure.

The toxin caused specific contraction of the isolated jejunum of the g. pig. The acquirement of tolerance to repeated doses of toxin was observed on the isolated jejunum of the g. pig, the vessels of the hind limb, the supra-

*See page 577.

renals, and the vessels of the lung of the rabbit and cat.

II. The action of the toxin was studied on perfused organs. It caused the liberation of histamine from perfused cat's lungs and adenyl compounds from perfused liver of the rabbit and heart of the cat. It is probable that the action of histamine at the site of liberation in the lungs contributes to the oedema produced by the inoculation of toxin in the living animal. The significance of these findings in relation to manifestations of toxaemia are discussed.

—W. I. B. BEVERIDGE.

ROWLANDS, W. T., & HARBOUR, H. E. (1940). **The Antitoxin Content of Commercial Lamb Dysentery Serum.**—*Vet. Rec.* **52.** 843–845.

The results are given of tests for the antitoxin content of six brands of commercial lamb dysentery serum ; five were British and one of foreign origin. In view of the results obtained the need for official standardization is stressed. Two brands showed a low antitoxin content and were considered totally inefficient for field use, and a wide variation existed in the content of the other four.—J. C. WALLACE.

GALLO, P., & RODRIGUEZ, C. A. (1939). La enterotoxemia de los ovinos en Venezuela. [**Enterotoxaemia of Sheep in Venezuela**].—*Rev. Med. vet. Parasit., Caracas.* **1.** 55–67.

The authors describe an outbreak of enterotoxaemia in a flock of sheep imported from the U.S.A. Affected animals were all adults.

The causal agent was *Clostridium welchii* (type not indicated) and the lesions were those common in " struck ".—MILLER WATSON.

CLIFTON, C. E. (1940). **Utilization of Serine by** *Clostridium botulinum.*—*Proc. Soc. exp. Biol., N.Y.* **43.** 588–590.

The amino-acid serine is decarboxylated by washed suspensions of types A or B *Cl. botulinum* at about a third the rate observed for pyruvic acid. The optimum pH is on the alkaline side, probably at pH 7·5 and only one optical form is attacked at an appreciable rate. Among the degradation products, in an atmosphere of $O_2$, free $H_2$ or $N_2$, are $NH_3$, $CO_2$, ethyl alcohol, and acetic acid. Estimations of the amounts of these products suggest that serine is either deaminated and rearranges to form pyruvic acid, which is then fermented, or else is deaminated and decarboxylated simultaneously to yield acetaldehyde which is dismuted to give equimolecular quantities of acetic acid and ethyl alcohol.

The closely related amino-acid alanine is not attacked directly by *Cl. botulinum* except when a suitable H-acceptor is present.

The results indicate that *Cl. botulinum* may obtain a portion of its energy requirements by direct utilization of such amino-acids as serine as well as through coupled reactions between pairs of different amino-acids (the Stickland reaction).—ALFRED EDEN.

LEUTHOLD, A. (1940). Die Rolle der Muskulatur für den lokalen Tetanus des Pferdes. [**The Role of the Muscles in Local Tetanus in Horses**].—*Schweiz. Arch. Tierheilk.* **82.** 43–55.

There are few records of natural cases of local tetanus in the horse, although experimental injection of tetanus toxin may give rise to the condition. It has been suggested that local tetanus is produced when the toxin is liberated in muscular regions and is absorbed by the muscle end-plates, whence it travels to the nerves supplying them. In sites free from musculature the toxin passes directly into the bloodstream and generalized tetanus results. This view of the pathogenesis of local tetanus is supported by L.'s experiments on ten horses.

Of nine horses receiving toxin subcutaneously into the buttock, seven developed local tetanus followed a few days later by generalization of the disease. One animal received a very small dose and the condition remained localized. The ninth horse was given an injection at the coronet of a dose of toxin which, when given in the buttock, produced symptoms of local tetanus after four days and generalized symptoms at 11 days. No local symptoms developed and generalized tetanus appeared four days after the injection. The dose of toxin used varied from $\frac{1}{50}$th of a " horse M.L.D." to 5 M.L.D., the most suitable being $\frac{1}{10}$th – $\frac{1}{5}$th.

Local tetanus is rarely observed under natural conditions because (a) infection is usually in areas where there is little or no muscle, and (b) owing to the length of the motor nerves the rate of diffusion of toxin is slow, so that general symptoms develop from blood and lymph absorption before the local form appears.—E. G. WHITE.

GALLO, P. (1939). La necrobacilosis en Venezuela. [**Necrobacillosis in Venezuela**].—*Rev. Med. vet. Parasit., Caracas.* **1.** 72–84.

G. gives a detailed account of *Fusiformis*

*necrophorus*, and also describes a few cases of "foul of foot" in bovines, similar cases in swine, and some cases of calf diphtheria. No new knowledge is contributed.—M. WATSON.

BALDACCI, E. (1940). Revisione delle specie: *Actinomyces albus*, *A. chromogenus*, *A. odorifer*, *A. thermophyeus*, *A. viridochromogenes*, *A. hominis*, *A. innominatus*. [**Revision of the Genus** *Actinomyces*].—*Mycopathologia*. **2.** 145 – 161. [In Italian: abst. from English summary].

B. gives in detail the morphological, cultural, and biochemical characters of *A. albus*, *A. viridis*, *A. hominis*, and *A. innominatus*, and also a full list of all their synonyms. He considers that a few of the strains classified as *A. farcinicus* should have been placed in the species *albus*, and that the position of the species *farcinicus* needs revision.

EDGAR, G., & KEAST, J. C. (1940). **A Note on the Susceptibility of Horses and Cattle to Infection with Mycotic Dermatitis caused by** *Actinomyces dermatonomus* **(Bull).**—*Aust. vet. J.* **16.** 120–122.

[Mycotic dermatitis due to infection with *A. dermatonomus* is widespread in sheep in Australia, although seldom sufficiently prevalent to be of economic importance.]

Infection of horses with this fungus is here reported for the first time. Several draught horses were affected, the lesions being confined to the head. A typical strain of the organism was isolated which, on inoculation, reproduced the condition in sheep, horses, and a calf.

—W. I. B. BEVERIDGE.

KONST, H. (1940). **Influence of Heredity and Environment on Pathogenicity in Bacteria.**—*Publ. Amer. Ass. adv. Sci.* No. 12. pp. 34–45.

K. reviews the literature on the variation of pathogenic bacteria, with special reference to their virulence and prophylactic potentialities. He compares variants found in nature with those induced by artificial culture.

*Bacillus anthracis* has occurred naturally in many forms, and asporogenous forms, stable in culture, have been isolated from cow's blood. Loss in virulence by culture at 42·5°C. is related to a change from R to S type. Reversion of the process by culture on special media is possible. The biochemical characters of the variants show some relationship with differing morphology.

*Erysipelothrix rhusiopathiae* causes two forms of disease, one essentially acute and septicaemic and the other benign and chronic, the type depending upon the district. Alterations in pathogenicity may be caused by passage through resistant or susceptible animals. Morphological variations are possibly related to the degree of pathogenicity.

Avirulent strains of *Pasteurella aviseptica* occur naturally and they have also been developed by culture; an R type seems to predominate in such strains.

The genus *Actinomyces* is discussed with reference to the close serological relationship of acid-fast species in the genus with *Mycobacterium tuberculosis*. The clearest evidence of variants of *M. tuberculosis* has been obtained in cultures, notably of BCG. K. cites a cycle of variation in virulence of BCG. From BCG (strain 80) virulent S types were isolated following passage through g. pigs and these were later reduced to a virulence similar to that of the parent strain, after long incubation in special media.

*M. paratuberculosis* is discussed as regards R and S variants' rendering media more alkaline and acid respectively, as also occurs with strains of the avian type of *M. tuberculosis*. The potency for g. pigs of johnin derived from these variants is discussed.—C. V. WATKINS.

KLUYVER, A. J. (1940). **Microbial Metabolism and its Significance to the Microbiologist.** —*Rep. Proc. 3rd int. Congr. Microbiol. 1939.* pp. 73–86. New York: International Association of Microbiologists. [In English].

The fundamentals of microbial metabolism are summarized with reference to bacterial assimilation, dissimilation, and fermentation. Several examples are given which demonstrate that the nature of metabolic activity is not merely a question of cell and substrate but also of environment, involving temperature, pH of the medium, and the presence of small quantities of poisonous or narcotic substances. The importance of the factor of oxygen tension is stressed at length in the interpretation of sugar fermentation, nitrate reduction, and pigment production tests and in its influence upon enzyme activity and the indispensability of special accessory growth factors. Striking examples are given of the influence on metabolic activity of the previous history of a bacterial cell, apart from true variability phenomena which are also shown to complicate metabolic studies.

Concluding remarks refer to the significance of metabolism to the microbes themselves, in that every cell contains its proteolytic enzymes which will break down the essential protein systems present in the cell in the absence of a sufficiently oxidized state.—R. O. MUIR.

ROTH, E. (1939). Contributiuni la studiul metabolismului bacteriilor. [**Metabolism of Bacteria**].—*Thesis, Bucarest.* pp. 81. [Abst. from French summary].

Following a statement that streptococci growing either on a synthetic or in phosphate broth produce in the media a substance inhibitory to the growth of a subsequent inoculation of the same organisms, R. studied the rate of disappearance of some of the constituents of the media with growth of the primary culture. It was found that the principal changes were the disappearance of various carbohydrate substances (glucose in the case of synthetic medium and a complex glucide in broth) within 24 hours, and decrease of pH. If, however, the pH is readjusted to neutrality, the carbohydrate replaced, and the medium passed through a Seitz filter, a further inoculation with streptococci allows of abundant growth, thus disproving the idea of a specific inhibitory substance being produced by the primary growth. Further, it was shown that glucose could be replaced efficiently by laevulose, lactose, and mannite but less efficiently by sucrose, maltose, and glycerin.

The rate of disappearance of glucose from the media closely followed the development curve of the bacteria. By periodical renewal of the glucose and readjustment of the medium it was possible to secure as many as four consecutive growths on the same medium although the lag phase before new growth commenced increased with each subsequent inoculation, suggesting that some other undetermined factor was also required for normal growth.

—ALFRED EDEN.

QUASTEL, J. H., & WEBLEY, D. M. (1941). **Vitamin $B_1$ and Bacterial Oxidations. I. Dependence of Acetic Acid Oxidation on Vitamin $B_1$.**—*Biochem. J.* **35.** 192–206.

A detailed study has been made of the effects of vitamin $B_1$ on the oxidative powers of propionic acid bacteria cultured on vitamin $B_1$ deficient media. The stimulating effect which $B_1$ exerts upon many of the oxidative processes examined is attributed in part, if not entirely, to its action on the oxidation of pyruvic acid formed as an intermediate product. It is probable that cocarboxylase (vitamin $B_1$ pyrophosphate ester) is the effective catalytic agent. The pyrimidine and thiazole components of vitamin $B_1$ were together as effective as $B_1$ itself or cocarboxylase in catalysing the oxidation of acetic acid, although neither was effective by itself.—ALASTAIR N. WORDEN.

RAHN, O., & RICHARDSON, G. L. (1941). **Oxygen Demand and Oxygen Supply.**—*J. Bact.* **41.** 225–249.

The oxygen demand of various bacterial species during active multiplication, the rate of oxygen diffusion in culture media, and the fate of aerobic species in the absence of oxygen were investigated. A method is described for measuring the oxygen consumption of multiplying bacteria per cell per hour, and the results show that consumption does not depend on size only, as *Pseudomonas* requires more $O_2$ than the Enterobacteriaceae group for the same amount of cell substance. The rate of $O_2$ diffusion in media is shown to be very slow; media containing carbohydrates take up more $O_2$ than media without them and phosphates are active catalysts for oxidation, especially at a pH higher than 6. A study of the fate of aerobic bacteria after exhaustion of $O_2$ showed that not all types of bacteria behaved alike; the aerobic sporeformers died at a fairly rapid rate whilst *Pseudomonas* continued to multiply very slowly in the complete absence of $O_2$.—R. A.

LEVINE, A. S., & FELLERS, C. R. (1940). **Inhibiting Effect of Acetic Acid upon Microorganisms in the Presence of Sodium Chloride and Sucrose.**—*J. Bact.* **40.** 255–269.

Decreasing dilutions of acetic acid, alone or in the presence of 5% sodium chloride or of 20% sugar syrup, were allowed to come into contact for 15 minute periods with diluted broth cultures of the following four bacteria, *Bacillus cereus*, *Salmonella typhi-murium*, *Staphylococcus aureus* and *Phytomonas phaseoli* [a plant pathogen], and of *Saccharomyces cerevisiae* and *Aspergillus niger*. The inhibition of growth of the bacteria was almost directly proportional to the amount of acetic acid present. Thus in the presence of sufficient acetic acid to give a calculated total acidity of 0·15% and a pH of 3·3, there was a 98% reduction in numbers of *S. typhi-murium* as compared with control cultures to which water only had been added; with a total acidity of 0·005% and a pH of 4·2, the reduction was only 57%, and

proportional values were obtained with intermediate acidities. From a comparison of the inhibitory effects obtained with and without brine, it appeared that, at equivalent pH values, greater toxicity was observed in tubes containing the greater amount of acid. It appears that the toxic action of acetic acid upon micro-organisms is not due to pH alone.

It is worthy of note, that, apart from their effect upon pH, NaCl and syrup exerted little toxic action additional to that of the acetic acid, and that the presence of non-toxic amounts of acetic acid actually promoted the growth of *A. niger* by acting as a source of energy.

—ALASTAIR N. WORDEN.

SNYDER, M. L., & LICHSTEIN, H. C. (1940). **Sodium Azide as an Inhibiting Substance for Gram-Negative Bacteria.**—*J. infect. Dis.* **67.** 113–115.

In a comparison of methods for isolating streptococci in the presence of *Proteus vulgaris*, it was found that a 0·01% concentration of sodium azide prevented the characteristic spreading growth of *P. vulgaris* and inhibited the common Gram-negative bacilli of the faeces, allowing easy separation of the streptococci. The ordinary preponderance of Gram-negative over Gram-positive bacteria in faecal specimens cultured on blood agar was practically reversed by this concentration of sodium azide.—R. A.

MCILWAIN, H. (1940). **Pyridine-3-Sulphonic Acid and its Amide as Inhibitors of Bacterial Growth.**—*Brit. J. exp. Path.* **21.** 136–147.

The growth of various organisms (*Staphylococcus*, *Proteus*), promoted by the addition of nicotinic acid or amide to the medium, is inhibited by pyridine-sulphonic acid and amide. Three types of inhibition have been observed. The significance of these results in relation to the nicotinic acid metabolism of the organisms is discussed.—J. M. ROBSON.

## DISEASES CAUSED BY PROTOZOAN PARASITES

CURASSON, G., & ADJOVI, P. (1940). Sur les formes akinétonuclées des trypanosomes de l'Afrique Occidentale Française. [**Akinetoplastic Forms of Trypanosomes in French West Africa**].—*Bull. Serv. zootech. Epiz. A.O.F.* **3.** 80–86.

In examining strains of trypanosomes in French West Africa, one strain of *T. brucei* was encountered in pigs in which the akinetoplastic individuals amongst the short forms reached as high a figure as 77%. In forms with a free flagellum the akinetoplastic individuals numbered 21% in one case. These high percentages of individuals devoid of a kinetoplast did not occur in animals other than the pig, and no such forms occurred in rabbits or g. pigs inoculated with the same strain. In a horse infected with *T. evansi*, 50% of akinetoplastic individuals were present, whilst in *T. congolense* and *T. vivax* infections these forms were very rare, the highest incidence being 2·8%.

—U. F. RICHARDSON.

CURASSON, G. (1940). Sur le reveil provoqué des crypto-trypanosomiasis. [**Provoked Flare-Up of Latent Trypanosomiasis**].—*Bull. Serv. zootech. Epiz. A.O.F.* **3.** 159–163.

Five sheep were inoculated with *T. vivax*, and after the disappearance of trypanosomes from the peripheral circulation, the animals received an injection of 0·02 g. of pilocarpine intravenously and 2–10 c.c. of milk subcutaneously. In each case trypanosomes reappeared in the circulation within three hours and were present until death. It is pointed out that it is uncertain whether the injections provoked the flare-up, as the strain of trypanosome was unusually virulent, but remissions usually last a week and not only a few hours. The ability to provoke such reactions is important in view of the difficulty of detecting such latent infections, and it may also prove to be important in treatment, as it permits drug administration when the trypanosomes are accessible.—U. F. RICHARDSON.

MALBRANT, R. (1940). Gibier, tse-tses et trypanosomiases. [**Game, Tsetse Fly and Trypanosomiasis**].—*Bull. Serv. zootech. Epiz. A.O.F.* **3.** 187–202.

This article is a good statement of the argument that game destruction is ineffective as a method of tsetse eradication or of controlling trypanosomiasis, but it contains nothing original.

M. seems to have overlooked CORSON's work (*V. B.* **9.** 234.) which showed that *T. rhodesiense* may retain its virulence for man after prolonged maintenance in ruminants.

—U. F. RICHARDSON.

NIESCHULZ, O. (1940). Ueber die mechanische Uebertragung von Trypanosoma congolense durch Aedes aegypti. [**Mechanical Transmission of** *T. congolense* **by** *A. aegypti*].—*Arch. Schiffs- u. Tropenhyg.* **44.** 30–33.

Experiments were undertaken to ascertain whether the mosquito, *A. aegypti*, could transmit *T. congolense* mechanically. Mosquitoes were fed on infected g. pigs at a time when trypanosomes were numerous in the peripheral blood, and when half engorged they were transferred to healthy animals to complete their feed. The intervals between the feeds varied from 1–60 sec. Positive results were obtained in two of 1,000 attempts, the incubation periods being 9–10 days and 12–13 days.

It is concluded that *A. aegypti* can transmit *T. congolense* mechanically, but that its importance as a transmitter in nature is doubtful.

—U. F. RICHARDSON.

CULBERTSON, J. T. (1941). **Natural Transmission of Immunity against** *Trypanosoma lewisi* **from Vaccinated Mother Rats to their Young.**—*J. Parasit.* **27.** 75–79.

Following the discovery [*V. B.* **10.** 167 and 584.] that mother rats immune to *T. lewisi* transmitted an immunity to their young through their milk, an investigation was undertaken to ascertain whether the same immunizing substance would appear in the milk of rats immunized by vaccines. The vaccines used consisted of suspensions of 4·3 million trypanosomes per c.c. of 0·5% formolized saline. Eight injections of 0·1 c.c. of vaccine were given at intervals of three days. Immunity was found to be transmitted to the young, and again ingestion of milk of immune mothers was responsible for its appearance.—U. F. R.

ANDREWS, J., & LYFORD, H. S. (1940). **Cultural Observations on** *Trichomonas foetus*.—*Amer. J. Hyg.* Sect. C. **31.** 43–50.

In preparing pure cultures of *T. foetus* from contaminated material, the authors have been successful in eliminating bacteria by intravaginal infection of g. pigs, and by the V-tube migration method [see *V. B.* **6.** 861]. Both methods require the trichomonads to be active and numerous in the inoculum. Fresh exudate from an infected uterus proved to be the best inoculum, but success was also obtained by the use of vaginal washings strained through cheese-cloth and concentrated by centrifugation before use. Inoculated g. pigs develop two types of infection, one persisting 3–4 days and restricted to the vagina, and the other lasting 10–45 days and localized primarily in the uterus. The uterine colonies may be free from bacteria.

For the migration method, 0·7% saline was found to be as satisfactory as Ringer's solution. It was found that agar gave the best results when the gel was sufficiently viscid to support red blood corpuscles for at least 24 hours at 20°–25°C. 4 c.c. of 2% agar was mixed with 50 c.c. saline, and one drop of sterile defibrinated rabbit blood added. It appears that in agar gels trichomonads may migrate downwards or laterally as well as upwards, and some successful results were obtained by using petri dishes and taking specimens for the inoculation of subcultures at lateral distances from the inoculum. Routine cultures, after isolation of pure strains, were maintained on egg or serum slants (5 c.c.) covered with 5 c.c. saline or dextrose broth, 0·1 c.c. of defibrinated blood being added to the liquid portion. The defibrinated blood could be replaced by serum, whole blood, or egg-white. Serum-dextrose-broth medium supports a heavier growth than saline-egg-blood medium but for a shorter period. In the latter medium, organisms ordinarily live 3–4 weeks at 37°C., and by keeping the tubes at room temperature longevity could be prolonged to 3–4 months.—U. F. R.

ALLEN, E. A. (1940). **A redescription of** *Trichomonas gallinarum* **Martin and Robertson, 1911, from the Chicken and Turkey.**—*Proc. helminth. Soc. Wash.* **7.** 65–68.

In 1936, A. tentatively placed a trichomonad associated with certain cases of enterohepatitis in turkeys, chickens, and guinea fowl in the genus *Pentatrichomonas*. Further study has shown that the flagellate is identical with *Trichomonas gallinarum* from the chicken. It is now believed that members of the genus *Trichomonas* may possess from 3–5 anterior flagella. The original pentatrichomonad is now placed in the genus *Trichomonas* and the name *T. gallinarum* should be retained. Movement of the flagella is rapid and jerky and that of the undulating membrane is continuous, but the organism shows little forward progression, which distinguishes it from *T. columbae*. An account of the morphology of stained specimens is included.—C. HORTON SMITH.

CORRÊA MENDES, A. B. (1938). Leishmaniose nos cães de Lisboa. [**Canine Leish-**

**maniasis in Lisbon**.—*Arch. Inst. bact. Cam. Pest.* **7.** 389–395. [English, French and German summaries].

The author examined 240 stray dogs from the municipal depot and found five with leishmaniasis. This percentage (2·08) differs very little from that noted by ÁLVARES and PEREIRA DA SILVA in 1911, who found 3·1% of dogs affected.

The present cases were examined P.M., and material from the spleen, bone marrow, lungs, and dermis was examined. The formol-gel test was also used as a general guide, positive reactions indicating the necessity for more careful microscopic work. The formol-gel test coincided with microscopic examinations except in one case, although positive reactions sometimes did not appear for some hours. There were three positive formol-gel tests with samples from animals which were apparently free from leishmaniasis, but two of these had *Dirofilaria immitis* infestation and the other was infected by *Babesia canis*.—MILLER WATSON.

I. FAURE-BRAC. (1936). La leishmaniose canine. [**Canine Leishmaniasis**].—*Biol. méd.* **26.** 113–158.

II. FLARER, F. (1939). Bisher unbekannte Reproduktionsarten des Leishmanie bei Orientbeule. [**New Development Forms of Leishmania in Oriental Sore**].—*Arch. Schiffs- u. Tropenhyg.* **43.** 384–403.

III. CHUNG, H. L., HOEPPLI, R., & FENG, L. C. (1940). **Histopathological Observations in Twelve Cases of Canine Leishmaniasis in Peiping**.—*Chin. med. J.* Suppl. No. 3. pp. 212–223. [In English].

I. The author discusses the whole problem of canine leishmaniasis and points out that its greatest importance is that dogs may act as reservoirs of human disease. Whilst one type of leishmaniasis is classically confined to the Mediterranean Basin, cases have occurred in Brussels, and one case has been recorded in a child who had never left the Vosges.

It is considered that the canine disease is probably transmitted by the dog tick, *Rhipicephalus sanguineus*. The symptoms, lesions, and methods of diagnosis and treatment of the disease in dogs are described in detail. It is stated that of over 1,000 cases treated with antimonials, only 3–5% made complete recoveries. In a limited number of cases, anthiomaline gave more promising results than the other antimonials. This drug is used as a 6% solution, and it is recommended that it should be given intramuscularly, dosage for a 20 kg. dog commencing with 1 c.c. and rising by the fifth injection to 3 c.c. Injections should be given at intervals of 48 hours, and a course should consist of not less than 25 or more than 35 injections.

II. F. describes the forms of leishmania encountered in oriental sore, and concludes that extracellular multiplication is by binary fission, but in intracellular development nuclear multiplication may occur without division of the cytoplasm (pseudoschizogony), or, very rarely, true schizogony may be encountered. Granular forms are also described, it being suggested that these may represent a process of sporogony, and other forms with a kinetoplast but no nucleus, which it was thought might be sexual individuals. [The article is confused and unconvincing.]

III. The authors describe the histological findings in 12 cases of canine leishmaniasis in Peiping, the most important being the great increase in phagocytic cells in all organs except the central nervous system, accompanied by an increase in plasma cells and small lymphoid cells. The phagocytic cell increase was most striking in the skin, where thick layers were formed in the corium and subcutaneous tissue. The number of phagocytic cells containing leishmania was as a rule extremely high in the neighbourhood of ulcerating regions, and in non-ulcerated parts of the skin showing macroscopical thickening, nodule formation, seborrhoea, or depilation. They were only rarely present in normal skin. Infection was especially high in all cases in the skin of the ear. Large numbers of leishmania were found also in the conjunctiva, the border region between the the conjunctiva palpebrae and the conjunctiva sclerae being particularly heavily infected.

Infection of the internal organs was detected in all of the nine dogs in which these organs were examined, but the extent of the internal infection bore no relationship to the severity of the skin lesions. The infection of the spleen and bone marrow was more pronounced than that of other organs, although infection of the spleen was only light in some cases. The testes of three dogs examined showed a strong infiltration of plasma cells, and spermatogenesis had completely subsided.

It is advised that, in future surveys of canine leishmaniasis, examination of the skin for leishmania should be made as they will probably

be more easily found in skin material than in that obtained by liver or spleen puncture.

—U. F. RICHARDSON.

BRUMPT, E. (1939). Contribution à l'étude de l'origine des black-spores de Ross au cours de l'infection des stegomyies par le *Plasmodium gallinaceum*. [**Origin of "Black Spores" in** *Stegomyia* **Infected with** *P. gallinaceum*].—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 43–54. Osaka: Osaka Natural History Society. [In French].

B. observed "black spores" in 5·8% of *Aëdes aegypti* [= *S. fasciata*] allowed to feed once on an infected fowl, and in 14·6% of those reinfected after a few weeks. Flies fed on uninfected fowls contained none of these bodies, nor did males in the group of infected flies. For *A. albopictus*, the percentages were 8·24 of flies infected once, and 16·8 of reinfected flies, uninfected flies again being entirely negative. B. discusses various theories to account for the presence of these objects, concluding that they are usually chitinized degeneration products of sporozoites, and that the presence of spherical masses about the size of oocysts, and enclosing such "black spores", is proof that the fly has been previously infected with plasmodia.

—E. S.

HEWITT, R. (1940). **Exo-Erythrocytic Bodies in Canaries Infected with a Mexican Strain of** *Plasmodium cathemerium*.—*Amer. J. Hyg.* Sect. C. **31.** 61–66.

The appearance is recorded of exo-erythrocytic bodies in canaries inoculated with a strain of *P. cathemerium* from a house finch. The finch did not show these bodies nor did the first canary in which the strain was established. One of two birds inoculated from this first passage, and two of four in the third passage, showed the bodies. It is pointed out that some strains of *P. cathemerium* are free from these bodies, and that in others their appearance is sporadic, and it is suggested that if an exo-erythrocytic cycle does form part of the life-cycle of some strains of avian plasmodia, the factors which govern the appearance of such a cycle are biologically unstable.

It is noted that the sudden enormous increase of plasmodia in the peripheral blood, believed by some workers to be derived from the exo-erythrocytic forms, occurs also in birds which are free from such forms. A true toxoplasm was also encountered in the house finch and in one of the canaries, but it is not thought that this was transmitted by the blood inoculation.—U. F. RICHARDSON.

STEWART, J. L. (1941). **Pre-Natal Anaplasmosis.**—*Vet. Rec.* **53.** 56.

A calf which appeared normal at birth, but died the same day, showed typical gallsickness lesions. *Anaplasma centrale* was demonstrated in the blood and was also found in the blood of the dam which did not show clinical symptoms. S. concludes that infection must have been pre-natal.—H. E. HARBOUR.

RUBINO, M. C., & TORTORELLA, A. (1938). La anaplasmosis en los bovinos del Uruguay. [**Bovine Anaplasmosis in Uruguay**].—*Arch. Soc. Biol. Montevideo.* **8.** 202–208.

This is a report of two outbreaks of anaplasmosis in cattle in Uruguay. The first was in a herd of two-year-old Herefords which came from a tick zone but had been in tick-free surroundings for some months and were free of ticks when the disease broke out. The disease was artificially transmitted to other bovines.

The second outbreak concerned cattle from tick-free and tick-infested herds which had been removed to tick-free pastures and were free of ticks when they became affected. The symptoms and lesions were typical and the disease was artificially transmitted to other bovines. Most of the affected cattle had been de-horned and the authors consider that transmission was probably mechanical, by means of the de-horning knife, from infected animals.—MILLER WATSON.

NEITZ, W. O. (1939). **Ovine Anaplasmosis: The Transmission of** *Anaplasma ovis* **and** *Eperythrozoon ovis* **to the Blesbuck** (*Damaliscus albifrons*).—*Onderstepoort J. vet. Sci.* **13.** 9–16.

The experiments described in this article were designed to test whether the blesbuck, previously shown to be susceptible to *A. marginale* and *A. centrale* of cattle, could be infected with *A. ovis* and *E. ovis*. An active infection with *A. ovis* was produced with an incubation period of 20–32 days. Only a latent infection with *E. ovis* was produced. *A. ovis* could not be transmitted from the blesbuck to cattle, but it is probable that the blesbuck can act as a reservoir of *A. ovis* in nature. The blesbuck died at varying periods up to 107 days after the reaction, but death could not be directly attributed to this infection, although the

anaemia may have been a contributory factor.
—E. M. ROBINSON.

ZHURAVOK, L. S. (1940). Vivedenie novovo tipa molochnovo skota, ustoychivovo k piroplazmozu. [**Breeding a New Type of Cattle for Milk Production, Resistant to Piroplasmosis**].—*Soviet. Zootech.* No.5. 38–44. [Abst. in *Dairy Sci. Abstrs.* **2.** 259–260, copied *verbatim.* Signed: E. J. R.]

It is known that, while Zebu cattle and their crosses with domestic cattle may become infected with blood parasites, their resistance is high, and they are only lightly affected. Experiments have been begun in the U.S.S.R. with the object of establishing a useful dairy type of cross resistant to piroplasmosis. Selected Zebu bulls have been mated with typical, high yielding Red German cows, and the hybrids have been investigated as regards growth, milk yield, proportion of butter fat in the milk, and resistance to piroplasmosis. Thus, in one experiment, in four years, 334 $F_1$ hybrids were obtained, and the average yield of milk of the heifers in their first lactation was 2,480 kg. with 4·84 per cent of fat.

The experiments on resistance to piroplasmosis included the natural infection of hybrids by grazing on tick-infested pastures, artificial infection by placing ticks on them, and by inoculating with the parasites. In 1938, for example, of 23 hybrids infected in this way, 3 died, while the remainder recovered and maintained satisfactory growth and condition. There was no control group, but it is well known that a much higher rate of mortality is found amongst domestic cattle in those regions. There was no blood in the urine of affected hybrids.

GRAY, D. F. (1940). **Canine Leptospiral Jaundice in Queensland.**—*Aust. vet. J.* **16.** 200–203.

A rat-catching fox terrier showed intense icterus together with widespread haemorrhages in the subcutaneous, fascial, and visceral tissues. Blood and urine from the dog inoculated into g. pigs killed them only after four passages. Leptospira were found in sections of the kidneys of the dog and g. pigs. The spirochaetes were cultured and preliminary agglutination tests indicated that the strain was *L. icterohaemorrhagiae.*—W. I. B. BEVERIDGE.

I. MEYER, K. F., STEWART-ANDERSON, B., & EDDIE, B. (1939). **Canine Leptospirosis in the United States.**—*J. Amer. vet. med. Ass.* **95.** 710–729. 3 appendixes.

II. ELANDER, B. J., & PERRY, J. K. (1940). **Leptospirosis in Dogs.**—*Ibid.* **96.** 511–514.

I. An account is given of investigations which established the existence of canine leptospirosis in California and other areas of the U.S.A. Clinical diagnosis was confirmed in all cases by bacteriological and serological examination and by animal inoculation.

During the work 88 dogs were autopsied. Of these 41 showed marked jaundice (icteric type), 40 showed haemorrhagic gastro-enteritis (haemorrhagic type), and 7 were of intermediate type. In all cases the causative organism was *L. canicola*; *L. icterohaemorrhagiae* was not encountered. The icteric type of *L. canicola* infection as seen in California is, however, clinically identical with *L. icterohaemorrhagiae* infection as seen in dogs in Europe. The haemorrhagic type of *L. canicola* infection appears to be confined to California. It is indistinguishable clinically from Stuttgart disease. Treatment of both the icteric and haemorrhagic types of *L. canicola* infection is by the specific antiserum. Intravenous injection of large doses within the first ten days of infection frequently gives excellent results. Polyvalent sera are necessary in areas where both types may be found. No drug has been found to have any direct effect on the course of the disease.

The public health significance of canine leptospirosis is briefly discussed.

II. Recently an increase has been reported in the incidence of *L. canicola* infection in dogs on the west coast of America. Early symptoms include fever, anorexia, restlessness, diarrhoea, shivering, excessive thirst, and petechiation of the external mucosae. Later, vomiting commences, the temperature becomes subnormal, and ulceration of the mucosae occurs. In animals which live long enough jaundice usually develops and there may be respiratory complications. Treatment is symptomatic. Serum is effective but difficult to obtain. Diagnosis can be confirmed by an agglutination test. Prognosis is generally unfavourable unless animals are treated in the very early stages.

A number of clinical cases are described.
—D. D. OGILVIE.

*BABUDIERI, B., & CASTAGNOLI, B. (1940). Ricerche sulla frequenza dell'infezione da leptospire nei cani di Roma. [**Canine**

**Leptospirosis in Rome**].—*R.C. Ist. Sanit. pubbl., Roma.* **3.** 45–64. [Presumably identical article appeared in *Ann. Igiene* (*sper.*). 145–162. (1940)]. [Translation of abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 473].

The sera of 159 dogs in Rome were tested for antibodies against leptospira, strains of *L. icterohaemorrhagiae*, *L. canicola*, *L. oryzeti*, and *L.* "*mezzano*" being used as antigens. Positive results were obtained with 57 sera, 53 with *L. icterohaemorrhagiae*, two with *L. canicola*, and one each with the other strains.

PROKOPANOV, A. (1939). **A Case of Canine Spirochaetosis.**—*Vet. Klin., Sofiya.* **7.** 172–177. [In Bulgarian: abst. from German summary].

A description of a case of spirochaetosis [? leptospirosis] in a dog. Diagnosis was confirmed by the demonstration of spirochaetes in the urine, by the presence of agglutinins and lysins in the blood, and by infection of experimental animals.

The dog recovered after symptomatic treatment.

WARD, T. G., & TURNER, T. B. (1940). **Natural Infection of the Fetus with Leptospira icterohemorrhagiae in a Wild Rat.**—*Amer. J. trop. Med.* **20.** 727–730. [Authors' summary copied *verbatim*].

An instance of placental transmission of *Leptospira icterohemorrhagiae* in the wild rat under natural conditions is reported.

ALSTON, J. M. (1940). **Probable Effect of Therapeutic Injection of Serum on Agglutination Tests for Leptospiral Infection.**—*Brit. med. J.* Aug. 24th. 256–257.

In order to assess the value of the aggln. test for leptospiral infection after therapeutic injection of anti-leptospiral serum, the rate of disappearance of antibodies in injected rabbits was determined. Four young rabbits, whose blood serum volume had been found to be about 67 c.c., were injected with 0·67 c.c. anti-leptospiral serum, the titre of which was 1 : 30,000, giving a possible maximum titre in the rabbit of 1 : 300; agglutinins decreased to a very low titre within 48 hours in three animals and within 120 hours in the fourth. The power of agglutination at 1 : 300 dilution was not reached at all in one rabbit, only weakly in two after the first 5 min., and in the fourth rabbit between 7–48 hours after the injection.

—M. L. BINGHAM.

## DISEASES CAUSED BY VIRUSES

I. FORSSMAN, J. (1939). 1938 ars muloch klövsjukekommittés verksamhet. [**The Work of the Foot and Mouth Disease Committee of Sweden in 1938**].—*Svensk VetTidskr.* **44.** 22–34.

II. FRYKHOLM, N. (1939). Till redaktionen av Svensk Veterinärtidskrift. [**Comment on the Report of the Swedish Foot and Mouth Disease Committee**].—*Ibid.* 65–72.

III. FORSSMAN, J. (1939). Till diskussionen angående mul- och klövsjuke bekämpandet. [**Foot and Mouth Disease (Discussion)**].—*Ibid.* 134–138.

FORSSMAN criticized certain actions of the Swedish F. & M. disease control committee and FRYKHOLM, chairman of the committee, replied; FORSSMAN then made a further statement. The points raised are more about personal action than about scientific principle.

—J. E.

PANISSET, L. (1939). La fièvre aphteuse. A propos de l'origine et des progrès de l'epizootie régnante. [**The Origin and Progress of the 1937 Outbreak of Foot and Mouth Disease**].—*Biol. méd.* **29.** 531–544.

An account of the 1937 outbreak of F. & M. disease in France, which was introduced by sheep imported from North Africa, and which spread over the whole of France, and further into Belgium, Holland, Germany, Poland, Switzerland, and Northern Italy within nine months. An outline of the position in regard to methods of control and immunization is given, together with figures illustrating the enormous financial losses for which the disease is responsible.

GALLOWAY, I. A. (1939). **Pituitary Extracts and the Virus of Foot-and-Mouth Disease—the Effect on the Virus of Certain Chemical Methods Employed in Their Preparation.**—*J. Hyg., Camb.* **39.** 597–614.

As the injection of an imported pituitary extract into a cow, for the production of

oestrus, had given rise to an outbreak of F. & M. disease, a series of experiments was carried out to determine the likelihood of occurrence of virus in hypophyseal extracts prepared from infected animals. Tests carried out on g. pig pituitaries suggested that the infectivity of the gland was due to the blood contained in the structure. There was no evidence to suggest that the gland itself might be a site of multiplication of the virus, but the conditions of collection of the glands in the abattoir rendered it highly probable that glands taken from diseased animals would be contaminated with virus.

For experiments on the effect of the usual biochemical procedures in preparation of pituitary extracts, cattle pituitaries were grossly contaminated with virus filtrates. These glands were treated in three ways:–(1) Acetone desiccation in the cold—extraction with acetone, followed by treatment with alcohol and ether, and drying over $CaCl_2$, all at 0°C. This method failed to inactivate the virus, and batches of such material were found to be infective up to 44 days. (2) Precipitation of crude prolactin by alkaline extraction, followed by repeated precipitation at pH 5·5 and separation of crude thyrotrophic hormone. The initial stage of alkaline extraction (pH 8·5) was withstood by the virus but reprecipitation twice only, at pH 5·5, removed the infectivity. Such extracts would not be likely to be infective, unless the virus were contained within cells and so protected against the unfavourable pH. High concentrations of certain salts might also favour virus survival. (3) Preparation of "crude whole extract" by repeated extraction of acetone-desiccated material with 60% alcohol at 18°–20°C. The extraction with 60% alcohol at room temperature was viricidal, though the virus had previously been found to resist absolute alcohol at 0°C.

It is considered that probably the most efficient method of freeing a hormone preparation from virus is to adjust the pH of the medium to 4·5–5 for sufficient time to ensure uniformity throughout the solution, if this is possible without inactivating the hormone concerned.—J. B. Brooksby.

Alexander, R. A., & de Kock, G. (1940). **Rinderpest in Southern Africa.**—*Fmg S. Afr.* **15.** 173–175.

This article was written in order to put right certain misconceptions in the mind of the public and to bring the facts of the position before them. The question of susceptibility of various domesticated animal species and of game animals such as buffalo, kudu etc. is discussed, and the danger of susceptible species of game which roam long distances is emphasized. Buffalo may stampede and scatter widely when the disease breaks out amongst them, but wild pigs remain localized and keep the disease smouldering. The sources of infection in Central Africa and the danger of a southward spread are dealt with, and the methods of immunization against the disease are summarized. The authors discuss the measures adopted as a result of the Rinderpest Conference at Nairobi in February 1938; these measures appeared to be having some success, but in November 1939 it was decided that the Union of South Africa, and Northern and Southern Rhodesia, should contribute towards the establishment of a laboratory for vaccine production. This was established at Mbozi, and 60,000 cattle on the border of Northern Rhodesia and Nyasaland were inoculated; a start was also made on cattle up to the Central Railway. It is proposed to use goat vaccine later on these cattle which all received formolized spleen vaccine. In the concluding remarks the danger of the southward spread by game is emphasized; recently several outbreaks have occurred near the Central Railway with a subsequent southward spread. The necessity of the closest co-operation between all the governments concerned is indicated.—E. M. Robinson.

Schoening, H. W., Giltner, L. T., & Shahan, M. S. (1940). **Infectious Equine Encephalomyelitis in 1939.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 145–150.

Figures are given for the incidence of E.E. in the U.S.A. during the last five years; they are, 23,512 cases in 1935, 3,929 cases in 1936, 173,889 cases in 1937, 184,662 cases in 1938, and 7,988 cases in 1939; the general rate of incidence for 1939 is given as 1·12 cases per 1,000 animals, with a mortality of 30·3% of affected animals. The greatest number of cases occurred in July, August, and September, but 12 states, all of which experience extremely cold weather in the winter, reported cases from January to April, and the authors emphasize the necessity for accurate diagnosis when reporting the disease, especially during seasons when E.E. is not generally prevalent.

Reports received at the Bureau of Animal Industry during the year showed a total of

805,247 horses and mules vaccinated, the reported incidence of disease being 0·36 per 1,000 in the vaccinated animals against 1·3 cases per 1,000 in unvaccinated animals in the same states. From the figures of the Division of Virus-Serum Control, however, it may be estimated that some 6,000,000 doses were actually administered, and the reports of most of the states indicate that their figures were probably incomplete.

MAGENS, H. J. (1940). **A Practitioner's Experience with Equine Encephalomyelitis.**—*Vet. Med.* **35.** 176–178.

The best prophylactic is considered to be double vaccination with a reliable chick vaccine. In spite of much propaganda, less than 100 animals were immunized over a large area in Oklahoma; this was due to ignorance, inexperience, and inability to pay the costs. Good results were obtained with antiserum in doses of 200–450 c.c. given intravenously on three consecutive days. To reduce the cost the serum was diluted with normal horse serum, similar results being obtained. Citrated whole blood was occasionally used instead of normal horse serum, but in the larger doses used anaphylactic shock had to be guarded against. Improvement was noticed but it was somewhat slower. Symptomatic treatment and nursing should accompany the serum treatment.

—R. FISHER.

SHARP, D. G., TAYLOR, A. R., BEARD, D., FINKELSTEIN, H., & BEARD, J. W. (1940). **Properties of the Isolated Equine Encephalomyelitis Virus (Eastern Strain).**—*Science.* **92.** 359–361.

Some chemical and physical properties of the infective material prepared from diseased chick embryos by ultracentrifugal fractionation are described.

The purified virus is homogeneous in the ultracentrifuge, $S_{20}° = 253 \times 10^{-13}$ [see also *V.B.* **11.** 444]. Between pH 7·0 and 8·5 it is most stable, but there is a tendency to disintegration which is accelerated by increase of pH. At pH 6·5 the virus precipitates and its activity is rapidly lost. The virus is inactivated by ultra-violet light, the inactive material showing the same $S_{20}°$ value as the active, although the boundary is more diffuse.

Analytical data for a typical preparation are given, including values for C, H, N, P, carbohydrate, phospholipoid, cholesterol, fatty acid, and nucleic acid.

The authors conclude that the virus is a complex of high molecular weight consisting of phospholipoids, cholesterol, fatty acid, and ribonucleoprotein.—R. A. KEKWICK.

TAYLOR, A. R., SHARP, D. G., BEARD, D., FINKELSTEIN, H., & BEARD, J. W. (1940). **Concentration and Partial Purification of Equine Encephalomyelitis Vaccines.**—*Science.* **92.** 586–587.

The concentration and partial purification of the immunizing principle in chick-embryo vaccines is described. Formol-treated (0·4%), chick-embryo extract is adjusted to pH 7·5 and centrifuged clear. The supernatant is adjusted to pH 4·8, centrifuged, and the sedimented material redissolved in Ringer at pH 7·0 to one-tenth the initial volume. The procedure results in the quantitative concentration of the immunizing substance with the removal of 90% of the protein contained in the starting material. The concentrated vaccine is active when injected subcutaneously or intradermally, and the small amounts required for immunization lessen the risk of reactions.—R. A. KEKWICK.

BEAUDETTE, F. R. (1940). **Equine Encephalomyelitis in Avian Hosts.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 185–203.

After reviewing the literature on E.E. in birds, B. gives a detailed account of three natural outbreaks of the disease in pheasants in New Jersey during 1939, and also of a possible fourth outbreak. Diagnosis was made by means of chick embryo inoculation of brain tissue from infected birds.

The first outbreak was reported from Forked River, Ocean County, and appeared about September 1st in one of two pens each containing 500 birds hatched in the spring of 1938; by September 7th the disease had appeared in the second pen. The birds in both these pens were later moved to three pens at some distance from the first two and the losses continued, although 900 birds, hatched in June, 1939, and kept in pens adjoining these, did not contract the disease. The losses ceased soon after September 25th with a total loss of about 150 birds. The symptoms included paralysis of the legs, head drawn back, staggering, and failure to eat and drink; if the bird could be isolated death occurred in one or two days or else there was gradual recovery, but in most cases other birds pecked the affected bird to death before it could be isolated. Laboratory tests showed the virus to be of the Eastern type. It is possible that outbreaks of the disease had

occurred on this farm in September 1937 and 1938.

The second outbreak occurred near Freehold, Monmouth County. On this farm the disease was in young stock and started in one pen on September 6th and continued until about October 24th, but did not break out in the adjoining pen for a month (beginning October 5th and continuing until November 7th), although the birds were only divided by a wire fence. The birds in the first pen were about 800 in number and were hatched between May 25th and June 9th, 1939, each lot being moved into the pen from the range when it reached the age of ten weeks, the first lot being moved on August 3rd and the last on August 18th. Those in the second pen consisted of about 500 pheasants hatched between July 1st and 6th, the first group being put in the pen on September 8th and the last on September 13th; about 100 birds were later added to this pen from a batch hatched on July 13th. Thus the birds in the first pen were older than those in the second, and, since the two pens were of equal size, were rather more crowded, with the result that the vegetation (corn, sunflowers, grass, etc.) was all cleared and pecking and cannibalism had started when there was still plenty of vegetation in the second pen; it was noticed that when the vegetation became scarce in the second pen the disease appeared. The loss in each pen was not recorded but the total was estimated to be about 500; a loss of 12 or 14 partridges kept on the same farm, but in confinement, was also reported. B. notes that losses continued even after three frosts, and that gapeworm (*Syngamus trachea*) infestation had caused considerable trouble prior to the outbreak of E.E. On this farm also the virus was of the Eastern type and there had been an outbreak of disease which might have been E.E. in the previous year, 1938, but beginning a fortnight earlier.

The third outbreak was at Sparta, Sussex County, commencing about October 20th. All the birds on this farm were young stock which had been reared on the premises in 1939, except for a pair of golden pheasants and a silver pheasant which were purchased in July, 1939 and remained well, a few birds bought in 1938, and about 40 pigeons which had had access to a stable and were brought to the place on September 3rd. A few losses had been recorded in 1938 but not from disease resembling E.E. On October 6th–8th field trials were held on this farm to which birds from Forked River, the scene of the first outbreak, were brought on October 5th and kept in pens prior to liberation; the disease at Sparta, however, began in the field before the birds were put in the pens previously occupied by the birds from Forked River, and continued after the stock was distributed into five holding pens. On November 14th a pen of 25 young cocks had had no losses for about three weeks, but an adjoining pen, containing 35 females, the two golden pheasants and the silver pheasant, was still suffering heavy mortality, as were also another pen containing about 40 females and a barn containing 65 young males and females. Finally, one set of losses occurred during the last week of November in a pen containing an old cock and 13 young hens. The total loss was about 100 out of 300 birds. Laboratory tests showed that in this case also the infection was probably the Eastern type of virus.

The fourth outbreak, at Cream Ridge, Monmouth County, showed all the usual symptoms of E.E., but no laboratory tests were made. About 20 cocks had been exchanged with the farm near Freehold, already described, in March; hatching began at the end of May and continued until the beginning of July, about 2,000 chicks being hatched; during the rearing period losses from gapeworm infestation were experienced. Near the end of August the young stock was put in holding pens adjoining the pen of breeders; corn and sunflowers grew in the pens, and when these were finished near the end of September the disease began, ceasing with the appearance of cold weather. Deaths numbered 40–50, both young and old stock being affected.

In his discussion of the outbreaks, B. points out that the disease is most common in those counties where it is also common in horses, but that the outbreak in Sussex County occurred outside the endemic area; the disease appeared to be endemic on two farms, but this does not necessarily mean that the pheasant is a carrier, and limited chick embryo inoculations with material from survivors gave only negative results. Discussing the method of transmission, B. emphasizes the existence of the disease for a month in one only of adjoining pens at Freehold and doubts whether the mosquito is the only transmitting agent [for recent work on the transmission of E.E. in horses, see *V. B.* **11.** 520]. He suggests that the disease may be transmitted by the birds pecking each other, but this would involve the presence of the virus in the nasal mucus and in the peripheral

circulation; unfortunately the nasal mucus was not examined, and one sample of blood tested contained no virus demonstrable by chick embryo inoculation. Finally, B. suggests that the gapeworm may play a role as carrier in E.E.

HART, L. (1940). **Infectious Avian Encephalomyelitis.**—*Aust. vet. J.* **16.** 95–101.

H. describes a disease of young chickens which appears to be identical with that known in the U.S.A. as infectious avian encephalomyelitis or epidemic tremor. The chief symptom is ataxia and this is often followed by tremor. The disease was transmitted by intracranial inoculation of bacteria-free filtrates of brain suspension. The incubation period after inoculation was 12–29 days. The disease did not spread by contact and the epidemiology suggests that infection usually takes place *via* the egg.

On P.M. examination, no macroscopic lesions can be detected. Microscopic examination reveals conspicuous aggregations of cells forming perivascular "cuffs", particularly in the brain and spinal cord, but also sometimes in the liver, spleen, lungs, and pancreas. There is some destruction of scattered nerve cells amongst which the Purkinje cells of the cerebellum are usually involved. Lesions were present in the cerebrum in all cases of the disease which were confirmed by microscopic examination of sections, and it is considered that for purposes of diagnosis it is sufficient to examine sections of cerebrum.—W. I. B. B.

CASALS, J., & PALACIOS, R. (1941). **Complement-Fixation in Encephalitis and Rabies Virus Infections.**—*Science.* **93.** 162–163.

A technique is described for the use of brain extract as an antigen in c.-f. tests for encephalitis and rabies virus infections. The preparation of antigen from a heavy brain suspension by repeated freezing and thawing and centrifugation in the angle head centrifuge was found to eliminate any anti-complementary effect until after at least three months' ageing. Duplicate titration of complement in saline and in the presence of antigens demonstrated that some antigens, especially crude brain suspensions, have no anti-complementary effect after incubation at 37°C., but are strongly anti-complementary after storage at 0°C. for 18 hours. Non-specific reactions given with unrelated antigens or normal brain by hyperimmune sera, prepared in rabbits and mice by the injection of homologous infected brain tissue, were found to be eliminated by heating for 20 min. at certain established temperatures of inactivation which varied according to the animal. Specific c.f. was obtained by this method with the viruses of St. Louis encephalitis, Japanese B encephalitis, Eastern equine encephalomyelitis, lymphocytic choriomeningitis, louping ill, and rabies fixed virus.—R. O. MUIR.

I. SMADEL, J. E., BAIRD, R. D., & WALL, M. J. (1939). **A Soluble Antigen of Lymphocytic Choriomeningitis. I. Separation of Soluble Antigen from Virus.**—*J. exp. Med.* **70.** 53–66. [Authors' summary copied *verbatim*].

II. SMADEL, J. E., WALL, M. J., & BAIRD, R. D. (1940). **A Soluble Antigen of Lymphocytic Choriomeningitis. II. Characteristics of the Antigen and Its Use in Precipitin Reactions.**—*Ibid.* **71.** 43–53. [Authors' summary copied *verbatim*].

III. SMADEL, J. E., & WALL, M. J. (1940). **A Soluble Antigen of Lymphocytic Choriomeningitis. III. Independence of Anti-Soluble Substance Antibodies and Neutralizing Antibodies, and the Rôle of Soluble Antigen and Inactive Virus in Immunity to Infection.**—*Ibid.* **72.** 389–405. [Authors' conclusions copied *verbatim*].

I. The virus of lymphocytic choriomeningitis can be sedimented in the ultracentrifuge and washed repeatedly; the virus retains its activity provided that a small amount of normal serum is present in the diluent. A soluble substance capable of fixing complement in the presence of immune serum can be separated from the virus. Washed virus fixes complement poorly. The serologically specific soluble antigen is widely distributed in tissues of infected guinea pigs, mice, and monkeys.

II. The soluble antigen of lymphocytic choriomeningitis which is readily separable from the virus is a relatively stable substance and appears to be of a protein nature. A specific precipitin reaction can be demonstrated when immune serum is added to solutions of antigen which have been freed of certain serologically inactive substances. The complement-fixation and precipitation reactions which occur in the presence of immune serum and non-infectious extracts of splenic tissue obtained from guinea pigs moribund with lymphocytic choriomeningitis seem to be manifestations of

union of the same soluble antigen and its antibody. On the other hand, the antisoluble substance antibodies and neutralizing substances appear to be different entities.

III. Anti-soluble substance antibodies and neutralizing substances, which develop following infection with the virus of lymphocytic choriomeningitis, appear to be separate entities. The times of appearance and regression of the two antibodies are different in both man and the guinea pig; the anti-soluble substance antibodies appear earlier and remain a shorter time. Moreover, mice develop them but no demonstrable neutralizing substances.

Injection of formalin-treated, virus-free extracts containing considerable amounts of soluble antigen fails to elicit anti-soluble substance antibodies and to induce immunity in normal guinea pigs; administration of such preparations to immune pigs, however, is followed by a marked increase in the titer of anti-soluble substance antibodies in their serum. On the other hand, suspensions of formolized washed virus are effective in normal guinea pigs in stimulating both anti-soluble substance antibodies and protective substances, and in inducing immunity to infection.

DYKSTRA, L. A. (1941). **Previously Unpublished Facts Pertaining to Hog Cholera Immunization.**—*N. Amer. Vet.* **22.** 25–27.

Data were collected, by means of a questionnaire to farmers in one of the principal swine-producing regions in the U.S.A., on several phases of swine husbandry connected with vaccination against swine fever. It was revealed that almost 90% of the farmers practised routine vaccination. The majority of pigs were vaccinated when they were 2–3 months of age. Approximately 57% of the farmers employed a veterinarian to do the vaccination, whilst 43% employed lay agents. 43·3% of the farmers reported that their largest losses occurred after vaccination.

D. draws no conclusions from the data presented, but it is suggested that the inoculation of S.F. virus may cause latent infections to become active, which may partly account for losses after vaccination. Many farmers also stated that there were distinct set-backs or "stunting" of the pigs following vaccination.

—N. J. SCORGIE.

DE BLIECK, L., & JANSEN, J. (1939). Over de immunisatie tegen varkenspest. [**Immunization against Swine Fever**].—*Tijdschr. Diergeneesk.* **66.** 958–975. [English and German summaries].

The authors compared the values of serum-virus vaccine, formol vaccine, and crystal-violet vaccine for immunization against S.F.

The serum and virus used were obtained from Yugoslavia. Nine piglets, which received 1 c.c. of serum and 2 c.c. of virus per kg. body weight, showed a strong immunity to contact infection from affected pigs.

Five out of eight piglets were injected with 15 c.c. and 25 c.c. of formol vaccine, supplied by the *Rijksseruminrichting*, at an interval of 20 days; three were kept as controls. All eight piglets succumbed to contact infection.

In another experiment, four piglets were inoculated by the simultaneous serum-virus method and four received two injections of formol vaccine. When exposed to infection, only the first group remained unaffected.

In the fourth experiment, 10 c.c. of crystal-violet vaccine, prepared by the method of MCBRYDE and COLE [*V. B.* **8.** 92.], were injected into four pigs. Another two pigs received two injections of 20 c.c. of formol vaccine, and two more were inoculated with 1 c.c. of virus and 30 c.c. of serum. When placed in contact with affected pigs, the first group developed the disease in varying degrees of severity, but all recovered; the second group contracted a fatal infection, and the third group remained immune. All the controls used became infected.

The authors recommend the use of the serum-virus method, and suggest that further research should be made on crystal-violet vaccine.

—L. TOBBACK.

—. (1939). Uruguay: Décret portant réglementation de la prophylaxie de la peste porcine. [**Decree for the Control of Swine Fever in Uruguay**].—*Bull. Off. internat. Epiz.* **19.** 584–587.

Regulations for prophylaxis of S.F. are detailed; they include compulsory registration of pig breeders, notification of deaths amongst pigs due to unknown causes, measures to be taken before and after confirmation of the existence of S.F., and rules governing the importation of pigs and the preparation and use of biological products for the prevention or treatment of the disease.—R. O. MUIR.

FIADEIRO, J. (1939). Ensaio de immunização activa contra doenças produzidas por ultra virus, por intermédio de bacterinas impregnadas. [**Active Immunization**

**against Virus Diseases by Virus Adsorbed by Bacterial Vaccines**].—*Rev. Med. vet., Lisboa.* **34.** 168–187. [French summary].

F. prepared a swine fever antigen in the following manner. A carbolized suspension of a 48-hour culture of *Salmonella cholerae-suis* was standardized at 20 billion bacteria per c.c. To five test tubes each containing 0·1 c.c. of the bacterial suspension were added quantities of virulent serum from a pig affected with S.F.; the quantities varied from 0·01–1 c.c. and 5 c.c. of saline were also added. The tubes were incubated at 37°C. for one hour, being well shaken twice during this period, and then placed in the refrigerator for 24 hours. After further thorough mixing the tubes were centrifuged at 3,000 r.p.m. for 15 min. The sediment was washed with saline and then re-centrifuged and the final sediment suspended in 2 c.c. of saline.

It is stated that the dose prepared with 0·01 c.c. of virus conferred immunity; the larger doses transmitted the disease.—M. W.

WALDMANN. (1939). Die Ferkelgrippe. [**Piglet Influenza**].—*Rep. 13th int. vet. Congr. 1938.* **1.** 491–497. [In German: English, French and Italian summaries. Discussion pp. 497–500 in English, French and German]. [English summary copied *verbatim*].

Pig grippe (German) and swine influenza (United States) are identical diseases. This is clearly shown from the etiology and the pathology. The differences, from the clinical and epizootological points of view, are due to the different virulence of the germ. These differences are shown also in the culture of the virus and experiments on laboratory animals.

There is actually no method of immunization, passive or active, nor means of treatment by chemical agents. From the viewpoint of prophylaxis good results have been obtained through the isolation of sows and their litters, the ones from the others, during 8 or 10 weeks following parturition.

BIELING, R., & OELRICHS, L. (1938). Spontane grippeartige Erkrankung des Frettchens. [**Spontaneous Influenza-Like Disease in Ferrets**].—*Behring.-Mitt.* **9.** 47–51.

During a mild influenza epidemic in which several laboratory workers were affected, a number of ferrets developed severe respiratory symptoms, one animal being killed *in extremis*, The lung lesions were similar to those produced in ferrets by the human influenza virus, but serological tests showed that the infective agent was not identical with the human virus. The virus was directly infective for mice and produced changes in these animals similar to those produced after continued passage by human influenza virus. After passage the virus produced pneumonic lesions in g. pigs and rabbits similar to those produced by human influenza virus. No protection was, however, conferred on such animals by administration of hyperimmune influenza serum, thus again demonstrating that a different virus was concerned.

The occasional finding of an influenza-like virus in laboratory animals being used for work on the human influenza virus should be borne in mind, as such a virus may disturb the maintenance in the animals of the human virus.

—E. G. WHITE.

LENNETTE, E. H., & HORSFALL, F. L., Jr. (1940). **Studies on Epidemic Influenza Virus. The Nature and Properties of the Complement-Fixing Antigen.**—*J. exp. Med.* **72.** 233–246.

A soluble antigen [see HOYLE & FAIRBROTHER. (*V. B.* 8. 439.)] which possessed strong complement-fixing properties in the presence of human convalescent sera, was separated from the virus particles by high speed centrifugation of infected mouse lungs. At 13,000 r.p.m. the decrease in titre of virus was seven times and of complement-fixing antigen two times, the corresponding figures at 27,000 r.p.m. being 316 and two. Some antigen was intimately bound to the virus, as repeated washings failed to free the virus particles from all traces of complement-fixing antibody.

By determining the concentration of antigen at different levels after high speed centrifugation, it was possible to calculate a sedimentation factor of approximately 90. The authors, comparing this figure with a sedimentation factor of 159·6 for haemocyanin, suggest that the particle weight of the soluble antigen is probably greater than 180,000 but less than 1,000,000. Precipitation of the antigen by ammonium sulphate showed that it was attached solely to the pseudo-globulin fraction. It was also present in ultrafiltrates which were not infective for mice and presumably contained no living virus.—R. E. GLOVER.

RUBINO, M. C., & ESPANTOSO, M. (1938). Sobre una enfermedad de los lanares: el ectima contagioso. [**Contagious Ecthy-**

**ma of Sheep**].—*Arch. Soc. Biol. Montevideo.* **9.** 1–11.

The authors report an outbreak of contagious ecthyma in sheep in Uruguay. They set up the disease in sheep with filtered material; details of the work done are given. In one set of such transmission experiments they failed to produce infection and it is suggested that this failure may have been due to the material's having been stored too long.—M. W.

REAMES, H. R. (1940). **Pathogenesis and Immunity in Ectromelia Virus Infection of the Nasal Mucosa of the Rat.**—*J. infect. Dis.* **66.** 254–262. [Author's summary copied *verbatim*].

The virus of infectious ectromelia of mice causes an inapparent infection of the rat's nasal epithelium. The virus multiplies, reaching a peak between the third and seventh days, and then disappears. Virus probably does not reach the olfactory bulbs.

There is no correlation between the disappearance of virus from the nasal cavity and the appearance of detectable amounts of circulating antibodies.

The serums of rats immunized by the intraperitoneal route contain the same amount of neutralizing antibodies as the serums of intranasally immunized animals. The latter animals, however, are resistant to " reinfection ", while the former are not. Virus does not gain access to the nasal epithelium, although it is present in the blood and spleen for 24 hours after intraperitoneal inoculation. A single instillation of virus into the nasal cavity is not sufficient to render the nasal tissue resistant.

No antibodies could be detected in the extracts of nasal tissue of immune rats. A histological study offered no evidence of the mechanism by which the nasal tissue is rendered resistant to reinfection.

In discussing the mechanism of the acquired resistance of intranasally immunized animals, the idea of an enhanced capacity to produce or concentrate antibody in a strategic area, the nasal tissues, is suggested.

JAHN, H. (1939). Experimentelle Untersuchungen über das Virus der Ektromelia infectiosa. [**Research on the Virus of Infectious Ectromelia**].—*Arch. ges. Virusforsch.* **1.** 91–103. [Abst. from German summary].

The shaved skin of white mice was infected with ectromelia virus, and from the fourth day elementary bodies were demonstrable in large numbers and could be harvested from the skin. The E.B. were concentrated by repeated centrifugation and obtained in a pure suspension.

G. pigs were infected with the E.B. and produced an antiserum of low titre, which agglutinated an E.B. suspension. Similar serum from mice failed to agglutinate E.B. G. pig antiserum was viricidal *in vitro* for ectromelia virus.

The virus was passaged 20 times through the brains of white mice; it caused a lethal general infection and increased slightly in virulence, but did not become neurotropic.

HALLAUER, C. (1939). Studien über die Variabilität des Hühnerpestvirus im Gewebsexplantat. [**Variations in Fowl Plague Virus in Tissue Culture**].—*Arch. ges. Virusforsch.* **1.** 70–84.

H. carried out comparative experiments with two strains of fowl plague virus, one being highly pathogenic for mice (Nieschulz strain) and the other almost non-pathogenic (Ascoli-Doerr strain). Both were virulent for fowls.

The mouse-pathogenic (Nieschulz) strain was cultured for 14 successive passages in embryonic fowl-brain tissue culture, and whereas it originally killed mice without any special tissue tropism, it became neurotropic at the seventh passage and infected mice died with symptoms of paraplegia with or without encephalitis. The original characteristic P.M. lesion, yellow fatty liver, ceased to be present when the above change took place. The fowl-pathogenic property of the strain did not vary.

Both strains were then cultured on fowl-embryo tissue culture without brain or spinal cord for 27 passages. The Nieschulz strain gradually became less virulent for mice and from the 24th passage was practically avirulent. It developed no degree of neurotropism. The other strain became pathogenic for mice from the eighth passage, but not more virulent in the succeeding passages. Both strains were also passaged up to ten times in fowl-brain as well as in mouse-brain tissue cultures; the Nieschulz strain became avirulent in the process but the other strain did not. Mice infected with the Ascoli-Doerr strain while it was non-pathogenic for them proved later to be immune to the Nieschulz strain.

In a third experimental series, both strains were cultured in fowl-embryo tissue culture without brain or spinal cord, with the eventual object of producing an immunizing and harmless strain for fowls. This aim was not

achieved within the 50 passages effected. The mouse pathogenicity of the Nieschulz strain decreased and was very low from the 40th passage, whilst the Ascoli-Doerr strain retained its low pathogenicity throughout.

In a fourth experiment it was found that fresh virus from fowls would not grow on mouse tissue unless it was first passaged on fowl tissue. The neurotropism reported above was effected again in this experiment.—J. E.

IYER, S. G., & DOBSON, N. (1940). **A Successful Method of Immunization against Newcastle Disease of Fowls.**—*Vet. Rec.* **52.** 891–894.

The authors discuss attempts of other workers to control the disease by means of immunization.

In their own experiments, after more than 19 and up to 33 passages in the first series and after 14 passages in the second series the fully virulent strain of Newcastle virus used became attenuated for fowls, and safe for use as an immunizing agent. The chorio-allantoic membrane of chick embryos was injected at the 9th–18th day of incubation. The lesions which developed in the egg tissues are detailed and illustrated. A dose of $0{\cdot}05 \times 10^{-6}$ g. continued to be lethal for chick embryos within 48 hours throughout 58 passages made during one year. The dose of vaccine used was 1–5 c.c. of a 10% emulsion of a whole, infected chick embryo in saline. Immunity set up in fowls was tested by a 1% emulsion in saline of equal parts of liver and from spleen a fowl dead after experimental infection, 1 c.c. of this emulsion containing at least 100 million fowl M.L.D.

Egg-cultivated virus was passaged through two fowls and the second fowl was thereby immunized, although no apparent disturbance occurred in either fowl.—C. V. WATKINS.

OLITSKY, P. K. (1940). **A Transmissible Agent (Theiler's Virus) in the Intestines of Normal Mice.**—*J. exp. Med.* **72.** 113–127.

Spontaneous encephalomyelitis of mice, now commonly called poliomyelitis of mice, is of widespread geographical distribution. Its similarity to human poliomyelitis is striking, not only in the distribution of the virus in the tissues, but in the clinical picture. Flaccid paralysis of the extremities associated with muscular atrophy is followed by contractures and deformities.

O. describes experiments to show that a virus indistinguishable from Theiler's virus can be recovered from the intestines of normal, young, stock mice except when they are still unweaned, and only irregularly in adult life. It produces characteristic encephalomyelitis on intracerebral inoculation and occasionally by intranasal instillation. The disease is not produced by other methods of inoculation. The virus has not been recovered from the central nervous system of normal mice.

It is estimated that the spontaneous disease occurs only once in every four or five thousand mice, although the virus can be recovered from almost any mouse. Artificial injury to the brain did not create a stimulus for the virus to migrate there from the intestines.—J. S. P.

I. HOAGLAND, C. L., SMADEL, J. E., & RIVERS, T. M. (1940). **Constituents of Elementary Bodies of Vaccinia. I. Certain Basic Analyses and Observations on Lipid Components of the Virus.**—*J. exp. Med.* **71.** 737–750.

II. HOAGLAND, C. L., LAVIN, G. I., SMADEL, J. E., & RIVERS, T. M. (1940). **Constituents of Elementary Bodies of Vaccinia. II. Properties of Nucleic Acid Obtained from Vaccine Virus.**—*Ibid.* **72.** 139–147.

I. Preparations of dry, washed elementary bodies of vaccinia, obtained by a technique which is fully described, showed comparative uniformity of chemical composition. The amounts of certain constituents, *e.g.* total N (15·3%), alpha-amino N after hydrolysis (3·4%), phosphorus (0·57%), phospholipid (2·2%), neutral fat (2·2%), reducing sugars after hydrolysis (2·8%), and cystine (1·9%) in the purified virus were significantly different from those in the various materials discarded during the process of purification. The amounts of neutral fat and phospholipid were not appreciably affected by extraction with ethyl ether or digestion with lipase, procedures which do not affect the virus. Cholesterol, however, was completely removed by these manipulations and hence is not considered to play an important part in the economy of the virus.

II. The nucleic acid of vaccine virus was isolated by classical chemical methods and found to be mainly, if not wholly, of the thymus type and not the yeast type. By the technique employed, 5·6% of the virus was shown to be thymonucleic acid, an amount which agreed with the value calculated in the assumption that the P bound in non-lipoid form was derived principally from nucleic acid. The findings are

of special interest in view of the fact that the nucleic acid of the other viruses is of ribonucleic type, although the biological significance of the difference is not obvious.—H. H. GREEN.

BURCKHARDT, K. (1939). Die Durchlässigkeit der Blut-Liquor Schranke und der Placenta für Bakteriophagen. [**Permeability of the Blood-Brain Barrier and of the Placenta for Bacteriophage**].—*Arch. ges. Virusforsch.* **1.** 140–154. [Abst. from German summary].

In experiments on rabbits it was found that intravenously injected *coli* phage reaches the cerebrospinal fluid and later leaves it. It is evidently not destroyed in the C.S.F., as it persists *in vitro* in C.S.F. drawn from injected rabbits. Its disappearance *in vivo* from C.S.F. is a function of time and amount, large doses requiring a longer time for their removal.

It was possible in some cases to demonstrate phage in the foetal membrane fluids and foetal heart blood after it had been injected intravenously into pregnant rabbits and g. pigs.

DOERR, R. (1940). Die Impermeabilität der Blut-Hirnschranken in der Infektionspathologie. [**Impermeability of the Blood-Brain Barrier in Infectious Diseases**].—*Schweiz. med. Wschr.* **70.** 504–506.

D. discusses changes which have occurred during recent years in opinions on the permeability of the blood-brain barrier. It was formerly believed impermeable to colloids, but is now known to be permeable to such proteins as serum globulin and to antibodies. Experimentally, it can be demonstrated that bacteriophages having a diameter of 50 m$\mu$ can pass through the barrier into the cerebrospinal fluid. Recent work suggests that tetanus toxin may pass through the blood-brain barrier and thus reach the central nervous system directly, in addition to centripetal spread along the peripheral nerves. It is probable that diphtheria and botulinum toxins may also enter the C.N.S. through the barrier.

[D. appears not to distinguish between the barrier between the blood and C.S.F. and that separating the blood from the nervous tissue itself. The permeability of the two barriers, however, is not necessarily identical.]

Viruses given intravenously to suitable animals in sufficiently large doses will often reach the C.N.S. and produce an active or latent infection. The extent to which viruses penetrate the blood-brain barrier under natural conditions is not at present known. The size of the virus particles seems of little significance, but the concentration of virus in the blood may be important. In the case of some neurotropic viruses there is no doubt of the occurrence of centripetal spread along peripheral nerves, but this does not exclude the possibility of simultaneous infection of the C.N.S. through the blood stream.—E. G. WHITE.

SEASTONE, C. V. (1938). **The Measurement of Surface Films formed by Hemocyanin, Tobacco Mosaic Virus, Vaccinia, and Bacterium gallinarum.**—*J. gen. Physiol.* **21.** 621–629.

The surface spreading of these materials is compared with that of pepsin and ovalbumin, which give an area per mg. about four times the size expected for the packing of spherical molecules. Haemocyanin gives twice the area calculated on this basis. Vaccinia and *Salmonella gallinarum* suspensions give areas in excess of that expected, but this may be due to contamination with small amounts of low molecular weight protein. For tobacco mosaic virus the data suggest that a monolayer of vertically oriented, rod-shaped molecules may be formed.
—R. A. KEKWICK.

## PARASITES IN RELATION TO DISEASE [ARTHROPODS]

JACK, R. W. (1941). **Notes on the Behaviour of *Glossina pallidipes* and *G. brevipalpis*, and some Comparisons with *G. morsitans*.**—*Bull. ent. Res.* **31.** 407–430.

In contrast with *G. morsitans*, *G. pallidipes* and *G. brevipalpis* do not attack man unless they are very hungry, nor are they as readily attracted by moving vehicles. Neither sex of *G. pallidipes* was attracted to a donkey unless hungry, but males of *G. brevipalpis* were attracted whether hungry or not. A grey blanket screen carried by natives attracted *G. pallidipes* moderately and *G. brevipalpis* poorly, specimens of *G. pallidipes* settling on the bottom edge, and those of *G. brevipalpis* alighting anywhere on the side and not infrequently on the top.

Traps of the Harris type, but usually with black cloth in place of hessian, caught a large number of *G. pallidipes* but very few *G. brevi-*

*palpis*. The percentage of female *G. pallidipes* caught in the trap was 61·2, and of these 14·5% were fully gravid. It was judged that most *G. pallidipes* entered traps between 4 p.m. and 5.30 p.m., the most effective positions for traps being those exposed to the sun in the late afternoon.

Methods are discussed of estimating from dried specimens the state of hunger at the time of death. Although in the case of both *G. morsitans* and *G. pallidipes*, females in all stages of nourishment have been caught in the traps, young females seem to be inadequately represented, and figures obtained with *G. morsitans* indicate that this is due less to a failure to be attracted than to a failure to enter. The figures indicating the alimentary condition of *G. pallidipes* caught in traps appear to support the view that hunger is not the primary stimulus, but the reaction seems to be definitely associated with the blood-sucking habit; thus in the case of tabanids, of which only the females suck blood, only females have been caught. There is some evidence that blood-sucking insects in general are less resistant to heat than related vegetable feeders.

It is suggested that the capture of any considerable proportion of gravid females on a host does not indicate a thriving tsetse community, but betrays insufficient opportunity of feeding in the neighbourhood. The fact that well nourished, heavily pregnant females are caught readily in traps erected in the open shows that they must move about relatively freely.

The modified Harris trap using black cloth instead of hessian is described. The catch was considerably less with this than with the Harris trap, but this is explained as being due to the larger size of the latter.—U. F. RICHARDSON.

BRODY, A. L., & KNIPLING, E. F. (1940). **Methods of Destroying Blowfly Larvae and Pupae in Carcasses and in Soil.**—*J. econ. Ent.* **33.** 662–665.

Various methods of destroying the larvae of *Cochliomyia americana* in carcasses and in the soil are discussed. The most efficient method appears to be spraying the carcasses and the soil on which they have lain with a solution containing ½ oz. sodium cyanide per gal. at the rate of 2 gal. per sq. yd.—W. MOORE.

DEONIER, C. C. (1940). **Carcass Temperatures and their Relation to Winter Blowfly Populations and Activity in the South-west.**—*J. econ. Ent.* **33.** 166–170.

Observations on carcasses of sheep, goats, and horses in winter, in Texas and Arizona, showed that radiant heat from the sun may raise and maintain the temperature of the carcass several degrees above that of the air, whereas carcasses in the shade have temperatures rather lower than that of the air. Once the carcass becomes infested by carrion-feeding fly larvae, the temperature may be raised as much as 50°F. by larval activity. These two factors may maintain a large carcass at a temperature favourable for larval development under conditions of air temperature at which larvae are inactive.

Oviposition by adult flies occurred at minimum temperatures of 35°–50°F. (*Calliphora* sp.), 41°–50°F. (*Phormia regina*), 50°–55°F. (*Lucilia sericata*), and 51°–60°F. (*Cochliomyia macellaria*). The range of minimum temperatures was due to the modifying influence of other climatic factors, *viz*, moisture, cloud, and time of day.

In small carcasses, such as rabbits or lambs, larvae were not able to generate sufficient heat to maintain activity at unfavourable air temperatures.—J. MACLEOD.

HENDRICK, J., MOORE, W., & MORISON, G. D. (1938). **The Tick Problem. [Correspondence].**—*Vet. Rec.* **50.** 1534–1535.

The authors seek to justify the destruction of deer and hares as a means of control of tick infestation. In one deer forest in which sheep were found to carry on an average about 100 ticks each, the deer harboured between 3,000 and 4,000 each. It is claimed that in such a case the lairs of the deer form foci of infestation from which the ticks are broadcast over a wide area. Such a finding is contrary to the conclusions reached by MACLEOD [*V. B.* **9.** 475].

On the assumption that in a suitable environment the tick population is directly proportional to the number of available hosts [Liebig's law (CHAPMAN, 1931)], the authors also contend that in Britain where the tick has no natural parasitic enemy, food is the principal biotic factor. MACLEOD [*ibid*], on the contrary, stresses the importance of humidity as a controlling agent under field conditions in this country.—D. D. OGILVIE.

HIXSON, H. (1940). **Field Biology and Environmental Relationships of the Gulf Coast Tick in Southern Georgia.**—*J. econ. Ent.* **33.** 179–189.

Observations are recorded on *Amblyomma maculatum* both in the field and in the laboratory. The principal hosts of the larvae in

southern Georgia, U.S.A., were the meadow lark, *Sturnella magna*, and the bobwhite, *Colinus virginianus*, but it occurred on many other birds and small mammals; the nymph was found on the same host species, while the adult occurred on large mammals, most commonly on sheep and swine. The highest incidence of larval infestation occurred from July to November, and the threshold of larval activity is suggested as approximately 70°F. Nymphs occurred at all times of the year, but were more numerous at temperatures near 70°F. than at higher temperatures. Adult activity was greatest during the summer.

Observations are given on the method and sites of attachment, the duration of each feeding stage, and the time taken for the development of gorged ticks under outdoor conditions. The principal limiting factors for the species are held to be susceptibility to desiccation, and relatively short survival if deprived of food, especially at warm temperatures.—J. MacLeod.

Lawrence, R. F. (1938). **The Relation of Mites to Animals and Plants in South Africa.**—*S. Afr. J. Sci.* **35.** 332–338.

L. gives notes on the economic importance of the various families of mites, especially as they occur in South Africa. A table shows the genera (but not the species) of each family known to occur on South African wild and domestic animals, birds, and plants. This list should be of the utmost value to those to whom a tentative identification of these parasites in the field is important.—E. S.

I. —. (1936). Lucha contra la sarna ovina. Cuadros demonstrativos de lo actuado por la Dirección de Ganaderia durante el primer semestre del corriente año. Visitas de inspección a los establecimientos en las cuales se comprobo que las majadas se hallaban limpias de sarna. [**Sheep Scab in Uruguay : Statistics**].—*Bol. Direcc. agric. Ganad., Montevideo.* **20.** 100–102.

II. —. (1936). Conceptos de los inspectores veterinarios regionales sobre la labor desarrollada y resultados obtenidos en la aplicación de la ley de lucha contra la sarna, en el plazo comprendido desde el 15 de Febrero hasta el 31 de Julio ppdo. [**Report on Result of Veterinary Police Control of Sheep Scab in Uruguay**].—*Ibid.* 149–158.

I. This report shows the considerable success of control measures against sheep scab. During the period February 15th to July 31st, 1936, 7,663 farms were inspected and found to be free of scab. These properties represented a total of 6,448,497 head of sheep.

II. The second report is a more detailed one giving the results of inspections in various districts. The veterinary police measures have proved, on the whole, very satisfactory.—M. W.

Gelormini, N., & Roveda, R. J. (1938). Linguatula serrata. [*L. serrata* (**in Dogs in Buenos Aires**)].—*Inst. Parasit., Univ. B. Aires.* **1.** No. 1. 3–12.

By examining dogs chosen at random the authors estimated that 6·9% of dogs in Buenos Aires and 15% in San Martín are infested with *L. serrata* in the nasal cavities. The largest specimen found measured 100 mm. in length and the largest number found in one animal was eight. The authors suggest that these parasites are the cause of many cases in dogs of rhinitis of obscure aetiology.—M. Watson.

## PARASITES IN RELATION TO DISEASE [HELMINTHS]

*Medulla, C. (1940). Il problema della schistosomiasi in Libia. [**Schistosomiasis in Libya**].—*Arch. ital. Sci. med. colon.* **21.** 217–239. [Abst. from abst. in *Zbl. Bakt. I. (Ref.).* **138.** 518].

Species of *Schistosoma* pathogenic for man and cattle are *S. japonicum*, *S. mattheei*, *S. incognitum*, and *Tricobilharzia ocellata*. Cattle pathogens include also *S. bovis*, *S. margrebowiei*, and *S. spindalis*. [See also *V. B.* **11.** 527].

Calzada, V. (1939). Sobre larvas de trematodes en moluscos del Uruguay. [**Molluscan Hosts of *Fasciola hepatica* in Uruguay**].—*Bol. mens. Direcc. Ganad., Montevideo.* **23.** 16–21.

While investigating the possible molluscan host of *F. hepatica* in Uruguay, C. discovered, in districts where *Fasciola* infestation is common, snails which he identified as *Ancylus moricandi*, and which were found to carry cercariae. Attempts failed to provoke artificial infestation by drenching sheep with these cercariae in water, and C. concludes that they are not the cercariae of *F. hepatica* but of some other trematode of wild animals.

[The figures are poor, but from them and

from the fact that the cercariae encysted as metacercariae in the vessels in which they were kept, it seems highly probable that these were, in fact, larvae of *F. hepatica*. Apparently no attempt was made to infest sheep with the metacercariae, the known infective stage.]
—MILLER WATSON.

GRIFFITHS, H. J. (1939). **Distribution of *Fasciola hepatica* Linn. and its Potential Vectors in Canada.**—*Sci. Agric.* **20.** 166–169.

G. lists the molluscs that have been incriminated as carriers of *F. hepatica* in the U.S.A., and gives the geographical distribution in Canada of the snails that have been recorded as vectors of the parasite in the U.S.A. and elsewhere. He shows it to be possible for the trematode to occur in almost every province since the potential vectors are distributed from coast to coast. He mentions, however, that up to the present the vector of the liver fluke in Canada has not been proven. After a brief resumé of the habitat of the molluscan genera involved, G. notes that the snails associated with the fluke may be found over a wide range of types of environment.—J. N. OLDHAM.

CAWSTON, F. G. (1940). **Some Difficulties in Determining the Life Cycle of *Fasciola*.**—*Parasitology*. **32.** 397–398.

The difficulty experienced in producing experimental infections of *Lymnaea* sp. with *Fasciola* may be due to the fact that apparently similar snails are, in reality, different species of *Lymnaea*, or that various species of *Fasciola* require different species of *Lymnaea* as hosts. Fascioliasis is recognized as common in areas apparently free from *Lymnaea*, and in areas where *Lymnaea* does occur very few of the snails may be infected. Experimental work is necessary to determine whether any essential changes occur in the fluke embryos whilst the ova are in the gut of the host and during the prehatching period on the ground.—M. L. B.

POU, M. C. (1938). Consideraciones sobre el problema de la equinococcosis. [**Echinococcosis in Uruguay**].—pp. 40. Buenos Aires: Facultad de Agronomía y Veterinaria. [8vo].

P. emphasizes the seriousness of echinococcosis in Uruguay. According to official statistics, 37·5% of sheep and cattle in Uruguay harboured *Echinococcus* cysts during the period 1930–35. Judging from reports from the various abattoirs, P. estimates the present position to be even more serious. He asks for much more rigorous legislation, and points out that the spread of the parasite takes place principally in rural areas, where meat inspection is not carried out and dogs may be fed on offal containing cysts.—MILLER WATSON.

MCCOY, O. R., DOWNING, V. F., & VAN VOORHIS, S. N. (1941). **The Penetration of Radioactive Phosphorus into Encysted *Trichinella* Larvae.**—*J. Parasit.* **27.** 53–58.

Twenty-eight laboratory-bred albino rats which had been heavily infected with *T. spiralis* 8–10 months previously were used in experiments to test the permeability of the cyst wall of trichinae by the use of radioactive P. The rats were fed 1 c.c. amounts of a solution containing radioactive P in the form of basic sodium phosphate and were killed after intervals varying from two hours to six days. The larvae were freed from their cysts by digestion with 0·7% pepsin and 0·5% HCl, collected by sedimentation, and the amount of radioactive P present in the larvae determined. Two hours after feeding, radioactive P was detected in the larvae and the amount increased rapidly during the first 24 hours; the maximal content was reached on the fourth day after which there was a gradual decline. Radioactive P was both taken up and lost more rapidly by the muscles than by the larvae. The results demonstrate that the fully developed cyst wall surrounding trichinae in muscle tissue is permeable to phosphate ions, but the data are not sufficient to indicate whether the absorption by the larvae represents an actual metabolic exchange or merely a diffusion of phosphate ions into the larvae. It is suggested that the rapidity of the absorption may indicate an active metabolism.—R. ALLCROFT.

POU, M. C., VIERA, O., CALZADA, V., & LUJAMBIO, L. (1937). La ancilostomiasis del perro en el Uruguay. [**The Dog Hookworm in Uruguay**].—*An. Fac. Vet., Montevideo.* **3.** 241–249.

The authors describe treatment of a number of cases of canine ancylostomiasis in Montevideo, 1 c.c. of chloroform in 30 c.c. of castor oil having given good results. A number of dogs was killed after a faecal egg count had been made, and the authors conclude that a count of 1,000 eggs per g. of faeces corresponds to one female worm in the intestine, there being usually half as many males as females. The only constant features observed P.M. were gastro-enteritis and lung lesions.

In order to estimate the incidence of ancylostomiasis in Montevideo, faeces of 112 dogs, chosen at random, were examined. Of these samples 54·5% were found to contain ancylostome eggs.—MILLER WATSON.

ERSHOV, V. S. (1939). K kharakteristike vidov roda Poteriostomum (P. skrjabini—novyĭ parazit loshadi i osla). **[The Morphology of *Poteriostomum skrjabini*, a New Parasite of Horses and Donkeys].** —*Trud. Kirov. zootekh.-vet. Inst.* **3.** No. 12. 49–56. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 523].

*P. skrjabini* n.sp., found in the horse and the donkey in 1936–37, is described. It is distinguished from *P. ratzii* by its more slender form, shorter alimentary tract, the characteristic shape of the female tail (short, broad, with a pointed, tapering, dorsally bent outgrowth), etc. Points of difference from *P. imparidentatum* are also described.

PAVE, S., & ROSSI, F. (1937). Eustrongylus visceralis; síntomas y lesiones en el perro. [*Dioctophyme renale*—**Symptoms and Lesions in the Dog**].—*9th Reun. Soc. argent. Pat. reg. N.* **2.** 1295–1304.

The authors autopsied a cross-bred bulldog which had died after showing nervous symptoms of a rabid type. They found ten specimens of *D. renale* in the abdominal cavity, liver, and both kidneys. There was a fair quantity of haemorrhagic fluid in the peritoneal cavity, and numerous fibrous adhesions were found between loops of intestine and between intestine and liver.

Both kidneys were much enlarged and in each case a portion of a worm protruded. Some of the worms were found between the lobes of the liver where they had impressed grooves in the liver substance. In the kidneys the medullary tissue had almost completely disappeared, although a certain amount of cortical substance remained. Worms were also found in the urinary bladder together with typical eggs. The worms varied from 20–60 cm. in length.

The owner of the dog reported having lost two other dogs in similar circumstances, and on enquiry explained that all three animals had been very fond of small fish of the genus *Tetragonopterus*, the only fish they ever received. The authors are investigating the matter with a view to ascertaining the intermediate host of the parasite.—M. WATSON.

LOSEV, L. A., EROKHIN, I. P., & NIKANOROV, A. F. (1937). Parafilyarioz loshadeĭ. **[Parafilariasis of Horses in the Territories of the Lower Volga].**—*Papers on Helminthology, commemorating 30 year Jubilee of Prof. K. I. Skryabin.* pp. 333–345. Moscow: Lenin Acad. Agric. Sci.

In the Saratov area "blood-sweating" in horses, due to *P. multipapillosa* in the subcutaneous tissue, is widespread. Harness galls are prone to develop on the sites of the lesions. Since haemorrhages have been observed to last for as long as eight hours, the authors conclude that the parasites excrete toxins which retard blood coagulation.

The condition may be diagnosed by examining freshly exuded blood for microfilariae. Ova have been found in blood examined promptly, but they usually hatch in 10–15 min. In heavily parasitized horses, larvae have also been found in blood from the jugular vein. Microfilariae die quickly as the blood dries, but can survive four hours in liquid blood plasma.

Since living microfilariae have been found in the proboscis and abdominal cavity of small flies of the steppes [species not given], the authors conclude that these flies must be intermediate hosts and carriers of the microfilariae. This would explain why the disease always occurs in the summer months. It would also explain why working horses with skin injuries are attacked much more than young colts and healthy stable horses.

Various treatments were tried; subcutaneous or intravenous injection of an aqueous solution of iodine and washing of the affected areas with 1% phenol, reduced the lesions. All other treatments tried were ineffective.

As prophylactic measures, the authors suggest care in maintaining the horse's skin in a sound condition, and the use of fly repellents on skin wounds.

HOBBS, W. R. (1940). **Canine Filariasis.**—*Cornell Vet.* **30.** 383–391.

This paper is a general review of *Dirofilaria immitis* infestation in dogs. The disease is known to occur in several of the northern states of the U.S.A., and the recognition and eradication of the vector or vectors is essential to prevent its reaching the high incidence it has assumed in the southern states. Details of drug treatment are discussed with particular reference to the use of filsol, fouadin and stibsol.
—M. L. BINGHAM.

*MERGASSOWA, E. F. (1939). Der Einfluss von Helminthotoxinen auf die tierischen

Gewebsproteasen. **[The Influence of Helminth Toxins on Animal Tissue Proteases].** — *Bull. Biol. Med. exp. URSS.* **8.** 478–480. [Abst. from abst. in *Zbl. Bakt. I. (Ref.).* **138.** 514].

M. includes in the term "helminth toxins", coelomic fluid and excretory products of *Ascaris suum* and watery and alcoholic extracts of *Ascaris* and of *Fasciola hepatica.* The tissue proteases were prepared from muscle and liver of frogs, cats, and swine, as well as from beef liver by enzyme extraction. The influence of the helminth toxins on the tissue proteases was determined by comparison of the activity of the enzyme in splitting the substrate with and without the addition of the toxins. The results were :– (1) coelomic fluid of *Ascaris* had the strongest activating effect on tissue proteases, when compared with the excretory products and watery and alcoholic extracts; (2) the activating influence on tissue proteases of excretory products of starving *Ascaris* decreased with the length of maintenance of the worms in culture.

## IMMUNITY

LIDDO, S. (1939). Agglutinazione "granulare" e "flocculare" dal sangue e dal latte di caprini affetti da brucellosi. **[Granular and Floccular Agglutination of the Blood and Milk of Goats Infected with Brucellosis].**—*Pathologica.* **31.** 69–71. [English and German summaries].

The haphazard occurrence of granular and floccular aggln. was noted, at dilutions ranging from 1 : 20–1 : 400, in eight of 15 positive blood aggln. reactions and in 14 of 34 positive milk aggln. reactions for *Br. melitensis.* The remaining sera in both cases gave either wholly granular or wholly floccular reactions, blood showing a preponderance of granular and milk of floccular agglutinations.

Since brucella organisms are unprovided with flagella, this behaviour cannot be attributed to O and H antigens. L. considers that the physico-chemical state of the medium containing the agglutinins was responsible, rather than the antigenic properties of the bacteria.

MARRACK, J. R. (1940). **The Function of Antibodies in Relation to Protein Structure.**—*Rep. Proc. 3rd int. Congr. Microbiol. 1939.* pp. 87–97. New York: International Association of Microbiologists. [In English].

After a summary of protein molecular structure with special details regarding serum globulin, M. points out that, although antibodies are generally accepted as modified serum globulins, such analyses of pure antibodies as have been made have not revealed any definite difference in composition from that of normal globulin. Examples are described of the specific combination of antibodies with determinant groups, and the probable nature of the latter is explained with references to the work of various authors. In a review of the facts relating to the formation of antigen-antibody complexes, a study is made of the five theories advanced to account for the production of insoluble aggregates by antibody and antigen. H. considers it probable that aggregation may occur by any of these hypothetical mechanisms, and he concludes with the statement of three problems, the solution of which depends on the elucidation of the structure of the protein molecule.—R. O. MUIR.

HARTLEY, G., Jr. (1940). **The Local Formation of Antivaccinial Antibodies by the Skin.** —*J. infect. Dis.* **66.** 44–52. [Author's conclusions copied *verbatim*].

Intradermal inoculations of aluminium hydroxide gel cause the mobilization of cells consisting almost entirely of macrophages which are capable of phagocytosing the gel.

When small quantities of vaccinia virus (testicular or neural strains) are adsorbed to aluminium hydroxide gel and are inoculated into tissues in which large numbers of macrophages are present, neutralizing antibodies are often demonstrable in extracts of this tissue before they are present in the undiluted blood serum or in other tissues.

Inasmuch as this tissue consists predominantly of macrophages capable of ingesting aluminium hydroxide gel to which the virus had been adsorbed, the conclusion seems warranted that these neutralizing antibodies are produced by the macrophages in this area.

WEINBERG, M., & GUILLAUMIE, M. (1939). Détermination du titre antitoxique des sérums antiperfringens A, C et D. **[Determination of the Antitoxic Titre of *Clostridium welchii* A, C and D Antisera].** —*Rev. Immunol.* **5.** 5–33.

The preparation of *Cl. welchii* A, C, and D toxins is described with details of yield, M.L.D. of liquid and dry toxin, and of the stability of dry toxin. An account is given of the determination of the test dose of several samples of *Cl. welchii* A toxin and two samples of *Cl. welchii* C toxin, and test dose values of different *Cl. welchii* A toxins are compared against a single standard serum and three standard English and three standard French sera. The composition of *Cl. welchii* A toxin was shown to be very variable, since the test doses of several samples of toxin with the same M.L.D. differed when titrated with a single standard serum. The variation in the values of the test dose of a single sample of toxin according to the standard serum used for titration could only be explained by a variation in the composition of the sera employed. Thus, samples of standard serum on the one hand and of toxin on the other can present great differences in constitution. Meanwhile, comparable results could only be obtained by titrating the same sample of toxin with a standard serum prepared against a toxin containing all the antigens secreted by *Cl. welchii* A. Estimation of the antitoxic titre of *Cl. welchii* C and D sera using one "unit" of different samples of the homologous toxin yielded the same conclusions as for *Cl. welchii* A sera. Less discordant results were obtained by the titration of *Cl. welchii* C sera with a test dose of two samples of *Cl. welchii* C toxin than with a unit of the same toxins.—R. O. Muir.

Weinberg, M., & Guillaumie, M. (1939). Considérations sur le titrage des sérums antigangreneux. [**Titration of Antigangrene Sera**].—*Bull. Acad. Méd. Paris.* **121.** 20–27.

Wide differences were demonstrated in the test doses of 11 samples of *Clostridium welchii* type A toxin by titration against a standard French serum, even in samples with the same M.L.D. The toxins were also used to determine the antitoxic titre of four different antisera. Variation in the test dose of the same sample of toxin titrated against standard sera was also demonstrated. Less difficulty was encountered in the titration of sera against *Cl. septicum*, *Cl. histolyticum*, and *Cl. oedematiens*, for which the respective maximum variations were 20%, 15%, and 22%.—R. O. Muir.

Křivinka, J. (1939). Několik pokusů tuberkulinem ze synthetickýchpůd. [**Trials with Synthetic Medium Tuberculin**].—*Zvěrolék. Rozpravy.* **13.** 98–103. [Abst. from German summary].

Tests were carried out on healthy and tuberculous g. pigs, rabbits, and dogs with tuberculin prepared on Sauton's medium.

After the good results so obtained, pastilles were made of this tuberculin and lactose and they were used for ophthalmic tests on 44 cows. The results were similar to those obtained with ordinary tuberculin on the same cows 14 days previously.

The high value of synthetic medium tuberculin is noted.

Maternowska, I. (1939). Próby analizy odczynu śródskórnego przy schorzeniach pasożytniczych. [**Intradermal Test for Helminthiasis**].—*Wiad. weteryn.* **18.** 233–244. [Abst. from German summary].

Parasites may be divided into two groups according to the course of the intradermal reaction:—(1) parasites which live only in the digestive tract for which the reaction is predominantly an early one, and (2) parasites of the tissues, which provoke a double phase or late reaction. The clinical course of the reaction depends on the species of parasite, on the duration of infestation and on the repetition of the test in the same patient. The diagnostic value of the test is equal for the early and late forms of reaction. Parasites of the alimentary canal cause chiefly a group reaction; the test is more specific for tissue parasites, and is hence of greater diagnostic value for these organisms. A positive result permits a clear diagnosis, but a negative one does not exclude the possibility of infection. A positive reaction for the first group of parasites may be obtained after the infestation has been discharged.

Moor, H. D., & Newport, N. M. (1939). **The Effect of Lymphocytes in vitro Upon Bacterial Toxins.**—*J. Lab. clin. Med.* **24.** 471–478.

Intraperitoneal injections of diphtheria toxin subjected to one-hour treatment with a suspension of lymphocytes *in vitro* were made in three g. pigs while three others received similar injections of untreated toxin. The results showed that the lymphocyte treatment had little, if any, effect on the toxin. Further experiments on mice were carried out in which lymphocyte-treated and untreated tetanus toxin and pneumococcus toxin were injected intraperitoneally. The animals receiving the treated toxins survived for much longer periods than those receiving the untreated toxins, except

when high concentrations of pneumococcus toxin were used. These results indicate that lymphocytes have some deleterious effects on bacterial toxins; the possible role which the lymphocyte plays in the immunity mechanism is discussed.—R. ALLCROFT.

KEKWICK, R. A., & RECORD, B. R. (1941). **Some Physical Properties of Diphtheria Antitoxic Horse Sera.**—*Brit. J. exp. Path.* **22.** 29–44.

This paper describes the behaviour of a number of samples of normal horse sera and the changes occurring in horse serum during the course of immunization with diphtheria toxoid, as revealed by the ultracentrifuge and electrophoresis apparatus.

Diphtheria antitoxic horse sera are shown to contain two antitoxins associated with the $\beta$ and $\gamma$ globulins respectively. These antitoxins are sharply distinguishable from one another in respect to flocculation time, in the empirical composition of the floccules formed with diphtheria toxin, and in respect to the *in vivo* : *in vitro* ratio. For preparations from most sera the properties of the antitoxins remain sensibly constant.

The antitoxic properties of diphtheria antitoxic horse sera may be quantitatively interpreted in terms of their content of $\beta$ and $\gamma$ antitoxic globulins.

O'MEARA, R. A. Q. (1941). **A New Concept of the Toxaemia of Diphtheria.**—*Lancet.* **240.** 205–208.

Comparison of clinical results obtained with diphtheria antitoxin when it was first introduced with those obtained now from use of commercial antitoxin, shows that in the development of the modern antitoxin some essential factor has been missed as it has proved much less effective in combating the toxaemia of diphtheria than the earlier promising results indicated. It is assumed that hypertoxic diphtheria in man is equivalent to the administration of many M.L.D. of Park-Williams No. 8 toxin to the g. pig in the laboratory, but there is really no comparison between the two. A theory, based on a new concept of the nature of diphtheria toxaemia, is suggested to explain why modern antitoxin fails in a large number of hypertoxic cases of diphtheria.

The author considers that diphtheria toxin is composed of two substances, A and B. Park-Williams No. 8 toxin contains a high proportion of A + substance B; toxin produced in hypertoxic diphtheria contains a high proportion of substance B + substance A. A is highly lethal for the g. pig and it has been assumed that hypertoxic diphtheria is caused by the production of A in excessive amounts although actually little is produced in the body of the patient, whereas large amounts of B are produced and the laboratory toxin contains relatively little of B. The effects of B are to promote the penetration of the tissues by A and when B is present in large amounts it leads to a great increase in the size of the local lesion, in the gelatinous oedema which accompanies it, in the amount of necrosis produced and in the tendency for wasting and paralysis later. There are two corresponding antibodies in antitoxin. Ordinary antitoxin contains a high proportion of the antibody to substance A, but is deficient in antibody to B so that when this type of antitoxin is used for hypertoxic cases of diphtheria, substance B is not neutralized and the antitoxin is rendered non-avid. Dissociation of toxin from its combination with antitoxin therefore takes place on dilution in the body and the toxaemia continues almost unabated. The avidity of antitoxin is determined by its power of neutralizing substance B and antitoxins rich in the antibody to B are required for treatment of hypertoxic diphtheria.

The similarity of many of the properties of B to those of the Duran-Reynals diffusing factor [see *V. B.* **11.** 381.] are discussed, together with the possibility of their identity. —R. ALLCROFT.

PRATT, H. N., & GREGERSEN, M. I. (1941). **Studies with Colored Antigens. I. The Rate of Disappearance of Dye-Albumin from the Blood.**—*J. Immunol.* **40.** 163–172.

A conjugated dye-protein (R-salt-azo-benzidine-azo-egg-albumen) was injected intravenously into four rabbits and one dog; the rate of disappearance of the dye-protein from the blood plasma was determined by analysing subsequent samples of plasma quantitatively for the presence of the dye by means of spectrophotometric determinations. The rabbits were kept in a metabolism cage during the experimental period, and the urine excreted during 24 hours was collected and examined spectrophotometrically for the presence of the dye. It was found that the dye-protein disappeared rapidly from the plasma, 30–80%, depending on the amount injected, disappearing in the first hour; complete removal was effected in 12–24 hours. None of the dye-protein could

be detected in the urine either by colorimetric or immunological methods and only a small fraction (5% or less) was taken up by the cellular constituents of the blood *in vitro*. The rapid disappearance of this substance from the plasma cannot, therefore, be explained either by a reaction between it and the cellular elements of the blood or by excretion through the kidney.—R. ALLCROFT.

RAMON, G., & RICHOU, R. (1940). Le développement et les variations de l'immunité antitoxique spécifique chez l'animal immunisé dans différentes conditions au moyen des anatoxines diphtérique, tétanique, staphylococcique. Conséquences théoriques et pratiques. **[Development and Variations of Specific Antitoxic Immunity in Animals Immunized by Diphtheria, Tetanus, and Staphylococcal Anatoxins].**—*Rev. Immunol.* **6.** 5–16.

Three series of rabbits were immunized with the toxoids of diphtheria, tetanus, and staphyloccus respectively, and it was found that anti-tetanic immunity was remarkably stable, anti-diphtheritic immunity a little less stable, and anti-staphylococcus immunity relatively unstable. When the same rabbit was immunized with a mixture of the three toxoids it was evident that the titres of each of the three antitoxins in the rabbit serum were at least equal to the titres obtained when one rabbit was used for each toxoid. Furthermore, when the stability of these antitoxins was studied it was found that even when produced in the same rabbit there was a marked difference in their stability. The authors point out that this finding is not in accord with Ehrlich's theory of antibody formation.—GWILYM O. DAVIES.

I. ECKER, E. E., & PILLEMER, L. (1941). **Anti-Coagulants and Complementary Activity. An Experimental Study.**—*J. Immunol.* **40.** 73–80.

II. ECKER, E. E., JONES, C. B., & KUEHN, A. O. (1941). **Studies on the Adsorption of Complement.**—*Ibid.* 81–87.

III. PILLEMER, L., SEIFTER, J., & ECKER, E. E. (1941). **The Effect of Amino Compounds on the Fourth Component of Complement.**—*Ibid.* 89–95.

IV. PILLEMER, L., SEIFTER, J., & ECKER, E. E. (1941). **The Effect of Reducing Agents on the Fourth Component of Complement.**—*Ibid.* 97–99.

V. PILLEMER, L., & ECKER, E. E. (1941). **The Effects of Acids and Alkalis on the Fourth Component of Complement, and the Rôle of Calcium.**—*Ibid.* 101–106.

I. It is generally believed that the phenomena of complementary action and blood coagulation are closely related but observations made by the authors do not warrant this conclusion even though the same fractions of blood serum may be involved. The results of a study of the effects of various types of anti-coagulants on complementary activity are presented. It is shown that heparin, a potent anti-coagulant, inactivates complement only when very large amounts are used. The less active synthetic anti-coagulants, such as polyvinyl sulphuric and cellulose sulphuric acids were the most active anti-complementary substances, being 75–100 times as active as heparin, while possessing only one-fifteenth of its anti-coagulative ability. Anti-coagulants such as sodium citrate, sodium oxalate and sodium hexametaphosphate, which are excellent anti-coagulants due to their interaction with ionized Ca, failed to inactivate complement. It has been shown that a portion of the bound Ca may be concerned in the action of the fourth component [see V], but ionized Ca does not play a role in the lytic power of the serum.

Large amounts of protamine also were necessary to inactivate complement, and the inactivation of complement by high molecular acidic compounds, such as chondroitin sulphuric acid and hyaluronic acid, which are not in themselves anti-coagulants, indicates an actual dissimilarity between the nature of coagulation and complementary activity. The anti-complementary action of the anti-coagulants may be attributed to their acidic or basic nature, and to their high molecular size.

II. Serial experiments were set up to determine the relative amounts of adsorbents required to remove the activity of fresh g. pig complement; the adsorbents used were lead phosphate, titanium dioxide, kaolin, magnesium hydroxide, aluminium hydroxide and zymin. Determinations were made of total N and Ca on the fresh complement and on the complement after adsorption, and of total P on the mid-piece (euglobulin fraction). An improved method is given for the separation of complement into its heat-labile components (mid-piece and end-piece). The results indicate that all of the agents used reduced the activity of the complement, depending on the amounts employed. Lead phosphate and titanium dioxide removed the mid-piece of complement

as did small amounts of aluminium hydroxide gel, but larger amounts of the latter removed the whole complement-complex. Kaolin and $Mg(OH)_2$ were not selective in their actions as they removed portions of both the mid-piece and end-piece. The action of zymin is of a different nature from that of the inorganic agents as zymin in optimal amounts specifically removed the heat-stable fraction of the mid-piece. Zymin had no adsorptive effect in the presence of 10% NaCl.

Marked variations occurred in the amounts of Ca and protein removed, but a correlation appears to exist between the ability of the inorganic agents to remove a large percentage of the mid-piece P, and their ability to inactivate specifically the mid-piece and its associated third component. This seems to indicate that removal of P, which is supposed to be present in a combined form with euglobulin as cephalin, interferes with the activity of the mid-piece, and it is suggested that the mid-piece of complement is closely associated with a phosphatide in the euglobulin fraction.

III. Studies were made on the effects of various amino compounds on the fourth component of complement; the relationship of the degree of dissociation of the amines to the degree of complement inactivation by them, the relationship of substituted groups of the amines to their ability to inactivate complement, and the nature of the union between the fourth component and the amines were investigated. Of the amino compounds tested, only primary amines and hydrazine inactivated the fourth component showing that the $-NH_2$ group is necessary for this reaction. Secondary and tertiary amines and negatively or polar substituted amines, which give rise to redox properties, such as the carbazides, urea, glycine, and hydroxylamine, did not inactivate any portion of complement, except by virtue of their alkalinity. The relation of these results to known serum constituents is discussed and all the evidence seems to indicate that the end-piece of complement is a calcium-carbohydrate-pseudoglobulin molecule of which the carbohydrate is the fourth component and the complex calcium-pseudoglobulin molecule, the carrier. The assumption is made that the carbohydrate contains the reactive carbonyl group.

IV. Reducing agents such as HCN, the alkali cyanides, and sodium bisulphite had no inactivating effect on the fourth component of serum complement, but depending on the pH, inactivated either the third component or the protein components. These results agree with previous observations made on the reactions of reducing agents and aldehydes, and these facts together with those of the effect of amines [see III] seem to indicate that only those aldehyde reagents which do not possess redox properties will inactivate the function of the fourth component, and conversely, that redox structure, in some manner, will protect this function; the protective influence of rate of reaction and dissociation effects is also discussed.

V. The general procedure in this series of experiments involved addition of desired amounts of the acids and alkalis to the complement, followed by incubation of the mixture for a definite period, neutralization of the solution to the original pH of the serum, and determination of the complementary activity followed by reactivation by addition of various components of complement.

It was found that end-piece and the fourth component are relatively unstable in acid solutions and stable in alkaline solutions, while mid-piece and the third component are relatively unstable in alkaline and stable in acid solutions. Organic acids which remove Ca did not inactivate the fourth component exclusively nor was it inactivated by removal of Ca in neutral or slightly alkaline solutions.

The data confirm the observations of GORDON *et al.* (1926) that ionized Ca is not associated with the fourth component, and indicate that no definite relationship exists between bound Ca and the fourth component. In fact, the weight of evidence indicates that Ca is not involved in the immediate labile and reversible actions of complement. The authors suggest that Ca may be a structural part of the pseudoglobulin-fourth-component complex but not vital to its function, and that removal of the Ca may be effected without disturbing fourth-component activity. Removal of Ca by acids causes pseudoglobulin denaturation and destruction of end-piece structure. Thus the relationship of Ca to end-piece observed by other investigators becomes an index of the degree of end-piece destruction by acids, used to remove the Ca.—R. ALLCROFT.

TISELIUS, A., & KABAT, E. A. (1939). **An Electrophoretic Study of Immune Sera and Purified Antibody Preparations.**—*J. exp. Med.* **69.** 119–131.

The object of the work described in this paper

was to determine the relationship of antibodies in immune sera to the $\alpha$, $\beta$ and $\gamma$ globulin components of normal sera, and to compare the electrochemical properties of antibodies in the original immune sera with those of purified antibody preparations. The technique of the electrophoresis measurements is described in some detail.

The electrophoretic mobilities of the components present in some horse, pig, rabbit, and monkey sera are given. In horse anti-pneumococcus I serum, the antibody is associated with a component not present in normal horse serum, but in the other sera examined the antibody appeared to migrate with the $\gamma$ globulin. Observations on sera before and after absorption with antigen provided estimates of antibody content in good agreement with direct determinations by nitrogen estimation.

The electrophoretic mobilities and isoelectric points of purified antibodies from the horse, cow, pig, and rabbit were determined. For the rabbit, preparations of differing methods gave the same mobility curve.

Some data were obtained indicating that on prolonged immunization in the horse, degradation of the antibody tends to take place.

—R. A. Kekwick.

van der Scheer, J., Wyckoff, R. W. G., & Clarke, F. L. (1941). **An Electrophoretic Study of Heated Horse Serum.** —*J. Immunol.* **40.** 39–45.

The heating of normal horse serum to 65°C. results in the formation of an electrophoretic component designated C. It precipitates easily on dialysis and can largely be removed by centrifuging. The material appears to be produced by the aggregation of the globulin components of the serum, and migrates electrophoretically with a mobility close to that of $\beta$ globulin. Under some conditions albumin may form part of the aggregate. A similar effect was observed with tetanus antitoxic horse serum.—R. A. Kekwick.

Glick, D., & Antopol, W. (1939). **Studies on the Chemical Nature of Factors Producing the Shwartzman Phenomenon.** —*J. infect. Dis.* **64.** 22–26.

Extraction experiments with *Proteus vulgaris* showed that there is little difference in the extractability of both preparative and reactive Shwartzman factors between pH 8·65 and 4·0. Below a pH of 4·0 when winter rabbits were used, no provocative potency was observed though preparatory potency could be demonstrated. Spring rabbits were found to be more sensitive, but the preparative potency was still greater than the provocative.

Purified protein-free carbohydrate fractions from *P. vulgaris* possessed no preparative power but only reacting factors as did cerasin and glycogen, although the latter two substances were effective only in relatively large doses. *Bacterium shigae* polysaccharide gave irregular results, but a protein-free preparation of *Bact. shigae* containing fatty and polypeptide materials in addition to polysaccharide was shown to have both factors. It is suggested that provocative potency in the preparations tested most probably arose from polysaccharides or compounds of high molecular weight containing carbohydrate units in their molecules [see also *V. B.* **2.** 309, and **8.** 590].—R. Allcroft.

Cannon, P. R., & Marshall, C. E. (1941). **Studies on the Mechanism of the Arthus Phenomenon.**—*J. Immunol.* **40.** 127–146.

Previous observations on the mechanism of the Arthus phenomenon are discussed. In view of the conflicting data an investigation was made using 0·1–0·2 c.c. of 3-5% crystalline egg albumen as the antigen and the method of agglutination of collodion particles for the determination of the precipitative potency of the serum. The cutaneous tests were always made in the ventral abdominal wall. Rabbits, g. pigs, cats, and rats were injected by different routes and the precipitative titres determined at intervals. The results demonstrate a marked parallelism between precipitative strength of sera and the intensity of cutaneous reactivity in the Arthus phenomenon and give additional evidence that this phenomenon is dependent upon the union of precipitins with antigen at the site of its injection. It is pointed out that much of the disagreement among investigators may have arisen because of the production of positive cutaneous reactions in animals in which precipitins were apparently absent from the serum. It is now shown that with weakly precipitating sera the usual methods for demonstrating precipitins are often inadequate, but when the more delicate collodion-particle method is used their presence can be definitely shown. At no time were positive cutaneous reactions observed in rabbits in whose sera precipitins were not demonstrated. The only instance of an exception was in young animals where cutaneous reactivity to inflammatory stimuli in general is naturally low.

The fact that partial desensitization caused a marked decrease in disappearance of cutaneous hypersensitivity which reappeared concomitantly with the subsequent rise in precipitative titre, and that when the specific precipitins were removed from an antiserum by antigenic absorption their capacity of conferring passive sensitization disappeared, is regarded as additional evidence that precipitins are essential for the development of the Arthus reaction. The phenomenon was produced in g. pigs by injecting adrenalin with the antigen in the fourth sensitizing injection to lessen the anaphylactic shock, but attempts to demonstrate the reaction in rats and cats were entirely unsuccessful.—R. ALLCROFT.

I. KENDALL, F. E., HEIDELBERGER, M., & DAWSON, M. H. (1937). **A Serologically Inactive Polysaccharide Elaborated by Mucoid Strains of Group A Hemolytic Streptococcus.**—*J. biol. Chem.* **118.** 61–69.

II. ROBERTSON, W. VAN B., ROPES, M. W., & BAUER, W. (1940). **Mucinase: a Bacterial Enzyme which Hydrolyzes Synovial Fluid Mucin and other Mucins.** —*Ibid.* **133.** 261–276.

III. MEYER, K., HOBBY, G. L., CHAFFEE, E., & DAWSON, M. H. (1940). **The Hydrolysis of Hyaluronic Acid by Bacterial Enzymes.**—*J. exp. Med.* **71.** 137–146.

I. A polysaccharide, which appears identical with that occurring in bovine vitreous humour and umbilical cord was isolated from cultures of three types of group A haemolytic streptococci in the mucoid phase. The substance was serologically inactive and was not found present in the media used.

II. In the course of studies on the physiology of normal and pathological joints, the possible mechanism for removal of mucin from the joint by enzymatic destruction was investigated. It was found that *Clostridium welchii* produced an enzyme termed "mucinase," which decomposed synovial fluid mucin. Cultures of various organisms were studied in an attempt to determine the distribution of the enzyme and a possible correlation between mucinase activity and the association of organisms with various joint diseases, but organisms such as $\beta$-haemolytic streptococci, pneumococci, gonococci, and *Bacterium coli*, which are known to produce septic joints with subsequent destruction of mucin, were found to have little or no mucinase activity. The mucinase activities of *Str. bovis* and *Str. viridans* were respectively 30% and 25% that of *Cl. welchii*. Mucinase also hydrolysed the mucins of vitreous humour, umbilical cord, and connective tissue, but did not hydrolyse the mucins from mucous membranes and glands. The preparation, purification and properties of mucinase are described.

III. An improved method is described for the preparation from pneumococci of the enzyme which hydrolyses the polysaccharide acid (hyaluronic acid) contained in vitreous humour, umbilical cord, synovial fluid, and the mucoid phase of group A haemolytic streptococcus. The same enzyme was prepared from group A haemolytic streptococci, from *Clostridium welchii* and from beef spleen. Two points of difference were noted between the *Cl. welchii* and pneumococcus preparations. In the latter and also in haemolytic streptococci, the major portion of the enzyme was found in the bacterial cells while in the case of *Cl. welchii* the supernatant broth culture was a potent source of the enzyme and none could be extracted from the bacterial cells themselves. Also a much wider range of activity was exhibited by the *Cl. welchii* preparation, indicating that this specific enzyme is associated with other carbohydrate-splitting enzymes in the culture medium.

It has been shown [see I] that group A haemolytic streptococci elaborate a mucopolysaccharide which appears to be identical with hyaluronic acid, and it is now suggested that the disappearance of the mucoid capsule of this organism is due to enzymatic hydrolysis of the acid polysaccharide. The relation between enzyme activity and the virulence and invasiveness of group A haemolytic streptococci is briefly discussed.—R. ALLCROFT.

I. CHAIN, E., & DUTHIE, E. S. (1940). **Identity of Hyaluronidase and Spreading Factor.**—*Brit. J. exp. Path.* **21.** 324–338.

II. HOBBY, G. L., DAWSON, M. H., MEYER, K., & CHAFFEE, E. (1941). **The Relationship between Spreading Factor and Hyaluronidase.**—*J. exp. Med.* **73.** 109–123.

III. MCCLEAN, D., & HALE, C. W. (1941). **Studies on Diffusing Factors. The Hyaluronidase Activity of Testicular Extracts, Bacterial Culture Filtrates and Other Agents that Increase Tissue Permeability.**—*Biochem. J.* **35.** 159–183.

IV. MEYER, K., CHAFFEE, E., HOBBY, G. L., & DAWSON, M. H. (1941). **Hyaluronidases of Bacterial and Animal Origin.** —*J. exp. Med.* **73.** 309–326.

I. It was previously suggested [see *V.B.* **11.** 382.] that the spreading factor of DURAN-REYNALS and MCCLEAN was identical with a mucolytic enzyme present in synovial fluid, a protein-free polysaccharide, composed of glucuronic acid and *N*-acetylglucosamine, termed hyaluronic acid. It has now been found that purified hyaluronic acid prepared from vitreous humour and synovial fluid is attacked by the mucolytic enzyme present in spreading factor solutions of different origin and that hyaluronic acid was the only substance in vitreous humour and synovial fluid acted on by the enzyme. It is therefore certain that hyaluronic acid is the substrate for the mucolytic enzyme in spreading factor; the enzyme is accordingly termed "hyaluronidase". Evidence is presented identifying the spreading factor with hyaluronidase, and a viscometric method for determination of the enzyme is given which is accurate to ± 10%. Stability and pH activity were investigated. A large number of animal organs, numerous bacterial filtrates, snake venoms, leech extracts, and azoproteins were examined for the presence of hyaluronidase or spreading factor and in all cases there was a strict qualitative correlation between hyaluronidase activity and spreading activity; in no case was spreading activity noticed in the absence of hyaluronidase activity. Testis was the only mammalian organ showing either hyaluronidase activity or immediate spreading in the dermis. Of the bacteria examined only *Staphylococcus aureus*, pneumococcus, *Clostridium welchii* types A and B, and *Cl. septicum* contained any appreciable quantity of hyaluronidase or spreading factor; no enzyme or diffusing activity was detected in at least 25 strains of *Streptococcus haemolyticus* nor was either detected in several strains of *Str. viridans*, meningococcus, *Bacterium coli* and *Cl. welchii* types C and D. With bacterial and snake venom hyaluronidase, somewhat bigger spreads were obtained than were expected from their hyaluronidase content, and it is suggested that the reason for this is probably the oedema caused by these fluids.

The supposition that hyaluronidase and spreading factor are identical postulates the existence of a substance, closely related to synovial hyaluronic acid, in the skin of rabbits. Such a substance was isolated and was acted on by testis hyaluronidase in the same way as is hyaluronic acid.

It was found that the mucinous substance which accumulates in the sexual skin of monkeys during the oestrus phase is acted upon by hyaluronidase, and is therefore closely related to or identical with hyaluronic acid. It would thus appear that the amount of hyaluronic acid present in the skin is subject to the influence of hormones. Salivary, gastric, and duodenal mucin, and mucin of the uterine cervix were not attacked by hyaluronidase.

II. In an attempt to determine the possible relationship between the phenomenon of spreading and hyaluronidase activity, a comparison of the properties of the two reactions demonstrated many points of similarity and certain points of difference. The presence of hyaluronidase and spreading factor was tested in preparations from pneumococci (type I, virulent and avirulent strains, type II, avirulent strain), group A haemolytic streptococci (virulent strains in the mucoid, matt, and rough phases), *Cl. welchii*, testis, pigskin, leech extract, commercial spleen extract, commercial hirudine and certain chemical substances such as azoprotein preparations and arsenious oxide. It was shown that all preparations which contained hyaluronidase also contained spreading factor. Certain properties were common to both, *viz*, heating at 65°C. and 100°C. for 30 min. produced a comparable effect on both reactions, and both were partially inactivated by iodine and neither was reactivated by sodium sulphite. A significant fact in establishing the possible relationship between the two was the demonstration of the presence of hyaluronic acid in skin.

Evidence was also obtained indicating that the spreading factor is not identical with hyaluronidase activity. Many preparations which had no hyaluronidase activity were found to possess marked spreading properties, especially streptococcus extracts, and no parallelism was observed between the degree of activity of spreading factor and hyaluronidase in the same preparations. Also antisera made against pneumococcal hyaluronidase preparations specifically and completely inhibited the activity of the homologous enzyme, but did not inhibit the spreading property of these preparations.

The significance of the similarities and dissimilarities between the two reactions is discussed and it is concluded that while hyaluronidase may play a role in the spreading

reaction, the phenomenon is a complex one and cannot be explained on the basis of a simple chemical reaction.

III. Detailed observations are reported on the characteristics of the spreading factor and its association with hyaluronidase activity. Some results previously reported [*V. B.* **11.** 382.] are extended and given in greater detail together with much new and important observation on the phenomenon of the diffusing reaction. Investigation of the hyaluronidase activities of various extracts and their diffusion in the dermis showed that filtrates of *Cl. welchii* and *Cl. septicum*, which cause rapid diffusion in the skin, had marked hyaluronidase activity; filtrates from certain strains of staphylococcus, streptococcus, and from a virulent type I pneumococcus also had marked hyaluronidase activity while filtrates from a virulent strain of *Salmonella typhi*, from *Cl. tetani*, and from *Corynebacterium diphtheriae*, which produce no diffusion, contained no hyaluronidase.

Investigation of influence of pH on the hyaluronidase activity of these substances showed that they were all most active in the region of pH 4·6. The rate of liberation of reducing substances by the enzymes and quantitative comparisons of viscosity-reducing activity suggest that two separate mechanisms may be involved in the reaction [see also *V. B.* **11.** 383].

Contrary to observations reported by MEYER *et al.* [see II], it is demonstrated that the reduction of viscosity and liberation of reducing substances by bacterial enzymes can be completely neutralized by appropriate and specific antisera which also inhibit diffusion in the skin. The probable failure of MEYER *et al.* to demonstrate inhibition of diffusion with antiserum is discussed. Study of the influence of the concentration of electrolytes in the reaction showed that the relative potency assigned to enzyme samples from different sources is greatly modified by the salt concentration of the system. The relation between viscosity and concentration of substrate was investigated and it was found that the viscosity is not proportional to the concentration; the bearing of this observation on estimation of enzyme activity is discussed. The very slight or negative amylase and phosphatase activity found in several bacterial and testicular preparations indicate that amylase and phosphatase play no part in the hyaluronidase activity of any of these enzyme preparations; no correlation was found between hyaluronidase activity and the action on gastric mucin. Many experiments were carried out to ascertain whether the hyaluronidase of viper venom, or testicular or bacterial enzymes, have any direct action on heparin or promote the coagulation of heparinized plasma; in all cases the results were negative. The influence of artificial diffusing factors (azoproteins and ascorbic acid) on the viscosity of mucoprotein and diffusion in the dermis was investigated and their action compared with that of naturally occurring enzymes. Preliminary experiments on the use of hyaluronic acid as a metabolite for bacteria which produce hyaluronidase showed that a large increase in the yield of hyaluronidase resulted from the inclusion of potassium hyaluronate in the culture medium of *Cl. welchii*. The significance of this increase is discussed in relation to the proliferation of these organisms in the tissues and hence the rapid extension of infection. Sulphanilamide and sulphapyridine did not inhibit production of hyaluronidase by *Cl. welchii* nor did they inhibit the *in vivo* activity of the enzyme.

The correlation between hyaluronidase activity and diffusion in the dermis is discussed and it is concluded that the experimental results justify the belief that diffusion in the skin is due to hyaluronidase activity.

IV. The occurrence, preparation, and properties were investigated of hyaluronidases from various strains of pneumococci and haemolytic streptococci, from leech and testis extracts, beef spleen and rabbit skin. The presence of the enzyme was demonstrated by two reactions, *viz*, by a depolymerization causing a rapid decrease in the viscosity of fluids containing hyaluronic acid, and by a hydrolysis of pure hyaluronic acid with the liberation of reducing sugars. The relationship of these two reactions is discussed.

The enzyme was found in all types and all strains of pneumococci tested, including S and R forms of types I, II, III, and VI. Contrary to an earlier statement [see III in preceding group of absts.] it is now demonstrated that the enzyme is contained not only in the organisms but in the medium as well. Great variability of the enzyme concentration was found in haemolytic streptococci, and the enzyme from these organisms was found to be very labile.

Enzyme preparations were obtained from rabbit skin and as hyaluronic acid has also been found in the skin, it is suggested that this organ

may play a considerable role in the metabolism of hyaluronic acid. The depolymerizing action of hyaluronidase is discussed and it is concluded that depolymerization and hydrolysis are probably due to the same enzyme attacking hyaluronic acid. The relationship between hyaluronidase and spreading factor is discussed further and although more evidence is reported indicating their identity, the inability to demonstrate hyaluronidase in streptococcal preparations which produce marked spreading activity is a serious drawback to the theory that they are identical substances. It is suggested that streptococcal material may contain a reversibly inactive enzyme which may be reactivated *in vivo*.—R. ALLCROFT.

SPRUNT, D. H., & MCDEARMAN, S. (1940). **Studies on the Relationship of Sex Hormones to Infection. III. A Quantitative Study of the Increased Resistance to Vaccinial Infection by the Estrogenic Hormone and Pseudopregnancy.**—*J. Immunol.* **38.** 81–95. [For previous parts, see *V. B.* **9.** 277, and **10.** 716].

A method for quantitatively measuring the resistance of a host to infection by vaccine virus was developed from that devised by PARKER [*V. B.* **9.** 316]. The results are compared with those reported by Parker, and the possible confirmation of his work is discussed. It was shown that castrates of both sexes, which received oestrogenic hormone for a period of three weeks before and four days after inoculation of the vaccine virus, were more resistant to the infection than castrates without the hormone. Likewise pseudopregnant rabbits were more resistant than control male rabbits.

—R. ALLCROFT.

## DISEASES, GENERAL

—. (1940). **Report of the Committee on Miscellaneous Transmissible Diseases.** —*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 283–284.

During 1939, cases of foot and mouth disease continued to be reported in Europe where only Finland, Latvia, Lithuania, Estonia, and Norway were free. In Great Britain, Denmark, and Sweden, however, only sporadic cases appeared. In Africa and Asia all countries were infected except Japan and in South America all except Colombia, Venezuela and the Guianas. North and Central America, the West Indies, Australia, and New Zealand remained free.

No new transmissible diseases were recorded in North America during the year. Equine encephalomyelitis, however, caused considerable loss, and anthrax was prevalent in the Pacific coast and intermountain areas. Bacillary haemoglobinuria of cattle attracted increased attention and showed some tendency to spread.

—D. D. OGILVIE.

OLSSON, E. (1940). Några ord om pälsdjurssjukdomar i Sverige. [**Fur Animal Diseases in Sweden**].—*Beretn. 5. nord. Vet.-mode, Kbh., 1939.* pp. 1002–1020. Discussion pp. 1020–1022. [In Swedish: English summary].

O. is consulting veterinary surgeon to the Swedish Fur Animal Breeders' Association. He gives an account of the prevailing diseases of fur animals in Sweden, where in 1938 there were over 100,000 breeding animals in captivity. The level of management is high, so that the loss from disease is relatively low. The more important diseases are described as follows :–

*Parasitic diseases.*—These used to be of great importance, until the practice of using wire-mesh floors became customary. Intestinal parasites of foxes in Sweden include *Uncinaria stenocephala*, *Toxocara canis*, *Dipylidium caninum*, and coccidia of the genera *Eimeria* and *Isospora*. Mink are usually free from worms, but harbour coccidia, whilst nutria are infested by *Trichuris* and *Strongyloides* as well as by coccidia. Many parasites present in the original breeding animals imported into Sweden died out quickly. Tetrachlorethylene is the anthelmintic most in use, but there is no cure for coccidiosis except general treatment to improve condition. Improvement in diet, including yeast, gives good results against the parasites of nutria. The Swedish climate is unfavourable for the survival of fox lungworms, which caused loss at first. Ear mites cause some trouble among foxes. Parasitism accounts for about 10% of mortality in fur animals in Sweden.

*Infectious Diseases.*—TB. occurs in foxes and mink, being usually contracted from bovine meat and offal including rumen containing lung mucus which has been swallowed. The cooking of meat and offal meets with serious difficulty

and has disadvantages and is not a satisfactory solution. Paratyphoid is a serious cause of mortality on fox farms. Cases have been found due to *Salmonella enteritidis* var. *dublin* (most frequent), *S. cholerae-suis*, and *S. typhimurium*. The mode of infection is not clearly known, but many cases seem to be due to meat poisoning. Apart from hygienic measures, serum therapy has shown some value in protecting animals under threat of infection, whilst prophylactic vaccination has also given apparently good results. It is very difficult to test a vaccine owing to the frequent failure under experimental conditions to infect healthy foxes. Paratyphoid has also been diagnosed in mink.

Distemper in foxes occurs to a limited extent. Dog distemper antiserum has a good protective action, though it is not known whether the disease is identical with dog distemper. Leptospirosis (*L. icterohaemorrhagiae*) occurs sporadically and epizootically, being conveyed by rats.

*Deficiency diseases.*—O. states that little is known about the vitamin A and C requirements of fur animals, or about their power to synthesize vitamin C, so that knowledge on the lack of these vitamins is small. Rickets is now rare. $B_1$ deficiency is important in foxes and mink, in which it causes cramps and acidosis respectively. Acidosis in mink in good condition is often lethal and is marked P.M. by severe fatty infiltration of the liver. In mink in poor condition it causes anaemia, fatty infiltration of the Kupffer cells of the liver, and nephrosis. Wheat germ oil effects a cure for slow breeding in dog foxes, in one-quarter of the cases. Its use causes transient haematuria. Abortion probably of nutritional origin causes a 3% loss in litters. It may be partial, part of a litter being aborted and part carried and born normally. Fox and mink cubs die from inanition to an extent of 10%, which is regarded as normal mortality. 50% of the total mortality in foxes occurs in the summer from accidental causes, including meat poisoning.

In the discussion STAGSTED questioned the wisdom of using wire-mesh floors continuously. Breeding foxes should have access to plenty of ground for exercise. BADSTUE reported bad results with gonadotrophic hormone in a controlled experiment. The untreated vixens were much more fertile than the treated. GLUD gave contradictory evidence, supporting the value of hormone therapy.—J. E.

PRESTON, H. (1939). Instrucciones sobre enfermedades de animales en el Perú. Segunda edición. [**Animal Diseases in Peru**]. pp. 78. Lima, Peru: Sección Técnica de Propaganda Agropecuaria. [8vo].

This booklet is for the use of stockbreeders and gives much useful information on the more important animal diseases of Peru and their treatment.—MILLER WATSON.

GIFFEE, J. W. (1941). **A Cross Section of Some Swine Problems as Viewed by a Bureau Veterinarian on Hog-Cholera Control.** —*J. Amer. vet. med. Ass.* **98.** 23–26.

G. deals with some swine diseases met with in eastern Iowa, of which swine fever is the most deadly and costly. It is pointed out that prophylactic vaccination is a preventive, but many owners do not appreciate this, preferring to take the chance that their herds will keep free from infection. Others assume that their pigs have other diseases such as influenza, erysipelas, and necrotic enteritis, and do not obtain advice and treatment until it is too late. The relation of nutrition to the development of necrotic enteritis is discussed. Deficient rations, insanitary surroundings, and parasites as a cause of losses in swine are also dealt with.—J. C. W.

—. (1940). **Report of the Committee on Transmissible Diseases of Poultry.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 278–282.

Pullorum disease in the U.S.A. is to be controlled under the National Poultry Improvement Plan. In some parts great progress has already been made by state regulatary agencies.

Recent studies on paratyphoid in relation to disease in man have revealed that birds act as an important natural reservoir of the organisms. Control is difficult; serological tests and hygienic measures are advocated.

A new disease, presumably a metabolic disorder, has been recorded in the North Atlantic states. Laying birds in the early stages of production are affected. The condition is characterized by fever, cyanosis, and death within a few hours. Autopsy reveals widespread petechiation, mucoid enteritis and focal necrosis of the liver. It seems possible that the disease is related to fowl cholera.—D. D. OGILVIE.

DALLING, T., WARRACK, G. H., & DUNCAN, E. H. L. (1937). **Post-Mortem Examinations on Birds Received during the Periods September 1934–August 1935**

**and September 1935–August 1936** [at Wellcome Physiological Research Laboratories, Beckenham, Kent].—*Reg. Sci. Poult. Breed. Ass. 1937.* pp. 118–131.

MONTGOMERIE, R. F., & WARRACK, G. H. (1938). **Post-Mortem Examinations on Birds Received during the period September 1936–August 1937, Wellcome Physiological Research Laboratories, Beckenham, Kent.**—*Reg. Sci. Poult. Breed. Ass. 1938.* pp. 24–30.

Tables show details of the causes of death in chicks up to 12 weeks old, in birds over 12 weeks old, and in birds other than fowls. Tables also show the variations in incidence during 1930–37 of some of the important diseases. The writers comment on the various conditions diagnosed; it is noted that the incidence of *Salmonella pullorum* infection in chicks has remained constant but fowl paralysis rose from 7% of the total number of outbreaks of all diseases investigated during 1930 to 42% in 1936–37. The percentage of cases in which the disease could not be determined decreased from 38 in 1930–31 to 7·7 in 1936–37.—J. C. W.

FREDERICK, L. D. (1940). **Turkey Disease Control in Commercial Flocks.**—*Proc. 43rd ann. Meet. U.S. Live Stk sanit. Ass., 1939.* pp. 212–217.

In recent years the incidence of disease in turkeys has tended to rise owing chiefly to the increased number of birds maintained in the U.S.A.

Enterohepatitis outbreaks are widespread. Phenylmercuric nitrate in the drinking water in a dilution of 1 : 50,000 given every third day is useful.

In the treatment of coccidiosis, feeding a dry mash containing 40% dried skimmed or buttermilk for five days, is advocated. Satisfactory results are claimed.

Sinusitis has caused much trouble in certain areas. Obstinate cases may require irrigation of the sinuses with weak sodium bicarbonate solution followed by an ephidrinated inhalant. Occasionally silver nitrate solution is used.

—D. D. OGILVIE.

TIMOFÉEFF-RESSOVSKY, N. W. (1939). Ergebnisse der Mutationsforschung in ihren Beziehungen zur Erbpathologie. [**Mutations and their Connexion with the Pathology of Heredity**].—*IV Congr. int. Pat. comp. 1939.* **1.** 289–302. [In German: English, French, Italian and Spanish summaries].

The inheritance of particular pathological conditions and of a predisposition towards disease arises as a result of mutations which occur spontaneously and are subsequently inherited. Such mutations may involve one or more genes ("gene mutation"), they may be due to changes in the structure of one or more chromosomes ("chromosome mutation"), or they may consist in an alteration in the chromosome pairs. The majority of mutations appear to be injurious to the organism. These views are supported by a summary of work on *Drosophila* which has already been published by the author and other workers.

The normal mutation rate can be increased in *Drosophila* by irradiation at short wavelengths, from the region of the ultra-violet to X-rays, $\gamma$-rays and the emanations from various radioactive agents. The effect on the mutation rate is independent of the wavelength, but directly proportional to the dose.

Two facts of immediate practical importance emerge from this study. The first is the application of irradiation to the production of new mutations in the plant kingdom. The second concerns the possible effect of irradiation on the male and female sex cells in man in the course of radiation therapy or among radiographers and radiologists or workers in industries in which radioactive substances are employed.—E. G. WHITE.

FRITZSCHE, K. (1939). Ist die Mareksche Hühnerlähmung eine Form der Hühnerleukose? [**Is Fowl Paralysis a Form of Fowl Leucosis?**]—*Z. InfektKr. Haustiere.* **55.** 68–74.

F. gives first a critical review of recent publications on the aetiology of fowl paralysis. He suggests that although the cellular pictures of fowl leucosis and fowl paralysis may be similar, they are nevertheless two distinct conditions. Among his arguments to this effect he states that leucosis may occur spontaneously in large numbers of birds, whereas paralysis occurs only by contact with diseased animals and affects the fowl species only. Further the incidence of the two in Germany over a number of years is not parallel.—C. W. OTTAWAY.

GRZYCKI, S., & GUFCA, W. (1937). Zmiany chemiczne w mięśniach podczas myoglobinemii porażennej u konia. [**Chemical Changes in Muscles of Horses Affected with Paralytic Myoglobinaemia**].—*Acta Biol. exp. Varsovia.* **11.** 183–188. [In French]. [Abst. in *Brit. Chem.*

*Physiol. Abstr.* March, 1938. p. 184, copied *verbatim*. Signed: R. T.]

The fatigued muscles of horses suffering from paralytic myoglobinaemia are distinguished by their high $NH_3$ and low phosphagen contents, with impaired glycogenolytic power; normal vals. are obtained after insulin therapy. The high blood-creatinine is ascribed to deficient resynthesis of adenosine triphosphoric acid, in absence of which phosphorylation of creatine cannot take place.

SEIBOLD, H. R. (1940). **Report on the Relationship of Thyroid Activity to Periodic Ophthalmia.**—*Amer. J. vet. Res.* **1.** 52–53.

The thyroid glands of seven horses reported as being clinically affected with periodic ophthalmia were examined histophysiologically, with negative results, for evidence of hypofunction. Particular attention was paid to the height and activity of the follicular epithelium and the consistency and staining reaction of the colloid. It is pointed out that examinations of this kind are limited in their value as the normal gland is so sensitive to environmental changes. [The results are not in accord with those of TAGLIAVINI (*V. B.* **9.** 31.)]—C. W. O.

SEEKLES, L. (1937–40). De interne secretie bij paresis puerperalis van het rund. II. Experimenteel onderzoek naar de aanwezigheid van het koolhydraaten het vetstofwisselingshormoon (den ketogenen factor) der hypophyse-voorkwab in het bloedserum van kalfziekte-patiënten, in vergelijking met vastende, droogstande koeien en vastende kalfkoeien, een etmaal na den partus. III. Voortgezet onderzoek naar de aanwezigheid in het bloedserum van kalfziekte-patiënten en normale kalfkoeien van factoren, die het gehalte aan acetonlichamen en suiker in het bloed en het gehalte aan glucogeen in de lever beïnvloeden. IV. Een vergelijking van de physiologisch-chemische eigenschappen van de in het bloedserum van het rund aangetroffen factoren, welke de suikerstofwisseling en het gehalte aan acetonlichamen in het bloed bij kalfziekte beïnvloeden, met de physiologisch-chemische eigenschappen van hormonen der hypophyse-voorkwab met analoge werking. [**Internal Secretion in Milk Fever. II. Research on the Presence of Carbohydrate- and Fat-Metabolism Hormone (Ketogenic Factor) of the Anterior Pituitary, in the Blood Serum of Milk Fever Patients, in Comparison with Fasting Dry Cows and Fasting Heifers, some Time after Parturition. III. Presence in the Blood Serum of Factors which Influence the Blood Acetone and Sugar and the Liver Glycogen. IV. Comparison of the Physico-Chemical Characters of Blood-Serum Factors which Influence Sugar Metabolism and Acetone Body Content in Milk Fever with the Physico-Chemical Properties of Anterior Pituitary Hormones having the Same Action**].—*Tijdschr. Diergeneesk.* **64.** 930–939, and **67.** 231–241 and 379–388. [English, French and German summaries]. [For part I, see *V. B.* **9.** 494].

II. Blood sera from two normal cows, and one typical, and one atypical case of milk fever, were injected into groups of rats and determinations made of liver glycogen and blood acetone. Normal saline and anterior pituitary extract were used for control injections. It is claimed that in milk fever there is an increase in glycogenolytic factor in the blood, attributable to increased pituitary activity.

III. Blood sera from milk fever cases and from normal cows 24 hours after parturition, and ultrafiltrates from the same sera, were injected subcutaneously in 12 c.c. quantities into groups of rats, normal saline being used for control injections. Total ketones and sugar were then determined in the blood of the rats killed four hours later, and glycogen determined in the livers. It is claimed, from the somewhat meagre data, that the results demonstrate a freely diffusible anti-ketogenic factor and a protein-bound ketogenic factor in the blood of cows affected with milk fever, not found in significantly increased concentration in the blood after normal parturition. Milk fever serum also showed a hyperglycaemic principle associated with the non-filtrable protein fraction, and a hypoglycaemic principle passing a membrane of moderate permeability, but not passing one of lower permeability [average pore diameters not specified]. No action on the blood sugar level of the experimental rats was found after injection of sera or of ultrafiltrates from normal cows 24 hours after parturition. Both in milk fever and after normal parturition a factor was found which lowered the glycogen content of the livers of injected rats.

The results are discussed in relation to the changes in blood sugar and blood ketones frequently found in milk fever, and are used to substantiate the author's theory [*V. B.* **9.** 494.] concerning the part played by the anterior pituitary in the milk fever syndrome.

IV. A qualitative agreement in biochemical properties is claimed for the ketogenic, glycogenolytic and hyperglycaemic factors occurring in blood serum in milk fever and the corresponding hormones of the anterior pituitary. No comparison is attempted between the anti-ketogenic and anti-hyperglycaemic (hypoglycaemic) factors, on the grounds that the nature of the "antibodies" provoked by the ketogenic and hyperglycaemic factors of pituitary origin is still unknown.—H. H. GREEN.

KAPELLER-ADLER, R. (1941). **Histidine Metabolism in Toxaemia of Pregnancy. Isolation of Histamine from the Urine of Patients with Toxaemia of Pregnancy.** —*Biochem. J.* **35.** 213–218.

The author has previously reported that histidine is a normal constituent of the urine of pregnant women, and now states that there is a diminished histidinuria in severe cases of pre-eclamptic toxaemia and of hyperemesis gravidarum. The decarboxylation of histidine to histamine was an obvious possibility in such cases, and attempts were made to isolate histamine from the urine of several patients. In the first two cases traces only were recovered but from the next four urines considerable quantities of histamine were isolated as the dipicrate or diflavianate. The identity of the histamine was confirmed chemically and pharmacologically. Large quantities of urine are required for the process described.

[Full experimental details are contained in the original paper, which is of considerable comparative interest and should be read by all who are interested in the pregnancy toxaemias of animals.]—ALASTAIR N. WORDEN.

KAY, C. F. (1940). **The Mechanism by which Experimental Nephritis is Produced in Rabbits Injected with Nephrotoxic Duck Serum.**—*J. exp. Med.* **72.** 559–572. [Author's summary copied *verbatim*].

1. Glomerulonephritis was produced in rabbits by the injection of anti-rabbit-kidney duck serum. 2. The clinical and pathological characteristics of the disease are discussed. 3. It was found possible by appropriate means either to accelerate the development of the nephritis or to prevent its appearance entirely. 4. An apparent correlation was found between the development of the nephritis and the formation of antibodies to duck serum by the injected rabbit. 5. The generally accepted concept of the mechanism of the disease does not appear to be in accordance with the facts here observed. A new hypothesis is presented.

DEY, H. (1939). Pathologisch-anatomische Untersuchungen über die Pathogenese der Bronchiektasen. [**Pathogenesis of Bronchiectasis**].—*Frankfurt. Z. Path.* **53.** 347–373.

This is a detailed review of the literature dealing with the pathogenesis of bronchiectasis in man and an account of D.'s views based on ten cases. It is possible to classify the cases into three groups as follows:–(1) Congenital bronchiectasis associated with congenital abnormalities in the lung. The bronchial walls have very little elastic or muscle tissue and the lung parenchyma often shows atelectasis or other abnormality. (2) Bronchiectasis associated with a deficiency of elastic tissue, but with the muscularis almost normal. The deficiency of elastic tissue is often evident in other tissues ("disposition"). (3) This comprises cases not classed in the first two groups, *i.e.*, with no evidence of congenital abnormality or of general deficiency of elastic tissue.

It is probable that the second group comprises more cases than either of the other groups, although further observations are needed and the classification is only tentative. —E. G. WHITE.

KUSCHER, A. (1940). Eosinophile Muskelentzündung beim Hund. [**Eosinophilic Myositis of Dogs**].—*Wien. tierärztl. Mschr.* **27.** 177–186.

Eosinophilic myositis of the dog is characterized by inflammation of the masseter, temporal, and pterygoid muscles. These muscles are swollen and hard; on section there are normal muscle fibres separated by masses of eosinophiles. The enlargement is due rather to cellular infiltration than to increase of muscle fibres. Clinical symptoms include distortion of the face, difficult deglutition, with exophthalmos, conjunctivitis and oedema of the eyelids (these latter symptoms being due to hypertrophy of the pterygoid). Differential blood counts gave an eosinophile percentage as high as 30. The aetiology is obscure. There is no evidence of myeloid leucaemia or parasitic invasion. K. is of the opinion that the condition is a form of allergy.—C. W. OTTAWAY.

SMITH, H. C. (1940). **The Relation of Bacterial Foci to Canine Pathology.**—*J. Amer. vet. med. Ass.* **97.** 238–246 and 253.

From a practitioner's viewpoint, the subject of focal infection in dogs is discussed with regard to incidence, distribution, symptomatology, and treatment.—J. W. WHITTICK.

WALKER, E. L., & HANDMAN, M. S. (1939). **Biological Reactions of Malignant Neoplasms. I. The Reaction to Bacterial Fractions.**—*J. Immunol.* **37.** 507–524. [Authors' summary copied *verbatim*].

Cultures of *Salmonella typhi murium* were separated into saline soluble and saline insoluble parts. From the saline soluble portion there were precipitated alcohol, acetic acid and ammonium sulfate insoluble fractions; and by evaporation an alcohol soluble fraction was recovered. In addition to these fractions the definite biologic compounds, polysaccharides, nucleoproteins and nucleic acid were separated from the cultures.

Preliminary tests by the Shwartzman phenomenon showed that all of these fractions are capable in proper combinations of eliciting reactions, and of acting either as preparatory or as intravenous provocative agents.

In the treatment of mice bearing sarcoma 180 only the nucleoprotein, the polysaccharides and fractions containing appreciable amounts of one or both of these substances were found capable of producing reaction in the tumors. Complete regression of this sarcoma treated with the more active fractions was obtained up to 100 per cent in individual experiments, with an average of 25 per cent in all experiments. Tumors affected but not completely destroyed by the same fractions averaged 74 per cent. It has been possible to affect total regression of sarcoma 180 in a maximum percentage with sublethal doses of the active fractions.

The reaction of the several strains of carcinoma to injections of active bacterial fractions was much less than that of sarcoma 180; few of the tumors underwent complete and permanent regression, but a considerable proportion of them showed hemorrhage, partial regression or regression followed by recurrence.

Our experimental results do not support the conception of a single, special bacterial substance active in the Shwartzman phenomenon and against malignant neoplasms; on the contrary, they locate these functions in the ordinary proteins and carbohydrates of the bacterial cell. This finding reconciles the conflicting results of previous attempts to separate the active substance.

I. ROUS, P., & KIDD, J. G. (1940). **The Activating, Transforming, and Carcinogenic Effects of the Rabbit Papilloma Virus (Shope) upon Implanted Tar Tumours.**—*J. exp. Med.* **71.** 787–812.

II. KIDD, J. G., & ROUS, P. (1940). **A Transplantable Rabbit Carcinoma Originating in a Virus-Induced Papilloma and Containing the Virus in Masked or Altered Form.**—*Ibid.* 813–838.

I. Two equal portions of the fragments of tumours (papillomas and carcinomatoids) elicited with tar on the ears of rabbits were placed in Tyrode solution containing rabbit papilloma virus and ordinary Tyrode solution respectively at pH 7·2, and after a brief interval they were implanted at corresponding situations in the subcutaneous connective tissue and leg muscles of the animals from which they had come.

The effects of the virus on the implanted tumours fall into five categories:– 1. The tumours were changed to virus papillomas. 2. Hybrid tumours occurred, morphologically expressive of the combined influence of the papilloma virus and the unknown factors for the neoplastic state of the tar tumour cells. 3. Some previously benign tumours were converted into carcinomas showing no morphological sign of the presence of the virus. 4. Some tumours were able to establish themselves and grow. 5. In some instances the tumour cells were not perceptibly influenced.

These findings corroborate the authors' previous observations [*V. B.* **11.** 43] on the effects of intravenous inoculation of the virus into rabbits carrying tar tumours, in which it was noted that some were converted into virus papillomas, others proliferated, and a considerable number took on the character of progressive cancers. It is pointed out that the rabbit papilloma virus never gives rise to anything but benign papillomas when inoculated by itself and the authors incline to the view that the virus has an adjuvant influence on the malignant growths, but that the exact effect is not understood.

II. A tumour considered to be a squamous cell carcinoma, both in morphology and in all phenomena of enlargement and metastasis, has been propagated through 14 successive groups of Dutch belted rabbits. In the later groups it killed early and metastasized frequently. The

original cancer arose from a virus papilloma and the virus or an agent nearly related to it has persisted and increased in the malignant tissue. This persistence was demonstrated by the appearance in the blood stream of every new host in which the tumour enlarged progressively, of an antibody capable of specifically neutralizing the papilloma virus *in vitro*. The titre attained was comparable with that in rabbits which had long-standing papillomas. The antibody was not present in normal rabbits nor in animals in which the cancer failed to establish itself.

The papilloma virus itself could not be extracted from the cancer, but this is not surprising as it is difficult to isolate the virus even from vigorous papillomas which it has activated.

This is the second occasion on which the authors have transplanted such a cancer, but the first was lost after the first transfer.

—J. S. PATERSON.

ZAHL, P. A., & COOPER, F. S. (1941). **Localization of Lithium in Tumor Tissue as a Basis for Slow Neutron Therapy.**—*Science*. **93.** 64–65.

If slow neutrons are introduced to a zone which has been perfused with certain chemical elements such as boron or lithium, nuclear capture reactions will occur which release very energetic particles and result in the local destruction of tissue. The method of direct hypodermic injection of B or Li into the tumorous area was not clinically feasible, and the possibility of selective localization in malignant tissue of slow neutron-capturing materials through the medium of intravenous injection was investigated. Comparison of the amounts of energy made available by the addition of B and Li to the tissue in various concentrations was studied. A maximum concentration of 0·01–0·03% Li in the tumour mass was found to correspond to a maximum gain of about 43% in the radiation dosage of the tumour over that of other tissues in the same mouse. It is pointed out that it is not the total energy absorbed but rather the difference in energy between tumour and healthy tissue which determines the optimum treatment condition.—R. ALLCROFT.

## NUTRITION IN RELATION TO DISEASE

FINN, S. B., & KRAMER, M. (1940). **Effect of Fluorine on Life Span of Rachitic Rats.**—*Proc. Soc. exp. Biol., N.Y.* **45.** 843–845.

The average age of death of 13 rats maintained from weaning on a rachitogenic diet was 65·2 days, while that of a similar number of rats fed the same diet supplemented with 300 p.p.m. of fluorine was 76·8 days. This difference of 11·5 days is regarded as significant and it is concluded that F increases the life span of rats fed a rachitogenic diet.—R. ALLCROFT.

SHAPIRO, H. A. (1941). **Paralysis Produced in White Rats by a Rachitogenic Diet.**—*Nature, Lond.* **147.** 362–363.

Eight young rats which had developed severe rickets after three weeks on a rachitogenic diet were continued on the same diet for some months. After several weeks a non-flaccid posterior paralysis began to develop. Weakness of the hind limbs, foot-drop, incoordination of gait, urinary incontinence and, in males, persistent priapism appeared in that order. The administration of α-tocopherol was without effect on the course of the disease. At autopsy the marked atrophy of all the thigh muscles was confirmed, but there was no evidence of any macroscopic haemorrhages in the nervous system.—ALASTAIR N. WORDEN.

KINTNER, J. H. (1940). **The Calcium-Phosphorus Ratio in the Ration of Horses.**—*Vet. Med.* **35.** 640–648.

Changes in the composition of bone tissue during the course of feeding experiments in horses were determined by trephining the superior maxillary sinus at intervals and analysing the discs obtained, at the same time analysing tissue from previously trephined areas to determine the rapidity of bone replacement. Such a method of study is obviously capable of extension to osteodystrophic disorders in general. An attempt was also made to measure bone density by a "penetrometer" registering the pressure required for insertion of a pointed stylet, but this procedure was of little value because of the wide variation in penetration pressure observed even over one square inch of facial bone.

From analysis of trephined material it was concluded that a $CaO : P_2O_5$ ratio of 1 : 1·4 resulted in a greater increase in bone minerals and a more rapid replacement of destroyed

bone than the ratio of 1 : 2·1 previously regarded as the borderline for prevention of equine osteomalacia or osteodystrophia fibrosa [see *V. B.* **3.** 264].

Chemical analyses of 27 samples of red oat hay are given, and attention is drawn to the possibility that depletion of bone minerals may result from an unfavourable Ca : P balance due to wide variations in the mineral content of hay and drinking water. The ratio $CaO : P_2O_5$ varied in the different samples of hay from 1 : 0·13–1 : 6·5 and this, combined with oat grain, might easily result in a gross ratio of 1 : 10 associated with absolute shortage of Ca.
—H. H. GREEN.

WRIGHT, L. D., & HAAG, J. R. (1939). **The Lactation-Promoting Effect of l-Cystine when Fed with Alfalfa Proteins.**—*J. Nutrit.* **17.** 263–268.

The addition of 0·4% *l*-cystine to a diet containing approximately 9% of crude alfalfa protein caused a marked increase in the weight of unweaned young of rats and reduced the rate of body weight loss of the lactating females by approximately 50% as compared with control animals on the same diet but without the *l*-cystine supplement.—R. ALLCROFT.

DAVIS, J. E. (1940). **The Mechanism of the Depressant Action of Liver and Choline Hydrochloride upon Experimental Polycythemia. The Effect of Sodium Nitrite and Choline Derivatives on Polycythemic Dogs.**—*J. Pharmacol.* **70.** 408–417.

D. has previously shown that polycythaemia induced in dogs by the daily oral administration of cobalt chloride or by daily exposure to low atmospheric pressure can be diminished by feeding either whole raw liver or choline chloride. A number of compounds having chemical or pharmacological affinities with choline were administered to polycythaemic dogs. Acetylcholine, physostigmine salicylate [eserine] and the ethyl ether of beta-methyl choline all caused significant reductions in the polycythaemia when injected subcutaneously, while sodium nitrite was effective when administered orally. The action of acetylcholine, as well as that of raw liver or choline chloride, could be blocked by oral administration of atropine.

The action of these drugs is attributed to a vasodilatation in the bone marrow; this would diminish the local anoxia which is considered to be the immediate stimulus responsible for polycythaemia.—ALASTAIR N. WORDEN.

GRIFFITH, W. H. (1940). **Choline Metabolism. IV. The Relation of the Age, Weight and Sex of Young Rats to the Occurrence of Hemorrhagic Degeneration on a Low Choline Diet.**—*J. Nutrit.* **19.** 437–448. [For previous parts, see *V. B.* **11.** 319].

Determinations were made of liver and kidney weights and of the total chloroform-soluble substances (liver fat) in the liver of rats maintained on low choline diets plus 0·3% of cystine as described in a preceding paper. When renal degeneration was severe the kidney became a greatly enlarged, dark red, bloody structure; mortality was highest on the seventh day and if the animal survived this acute stage recovery was rapid. If the haemorrhage was not severe the kidneys were nearly normal, except in size, on the tenth day of maintenance on the experimental diet. Haemorrhagic degeneration occurred within ten days in male rats 20–30 days of age, but the renal lesions were most severe on the sixth and seventh days in rats 21–26 days of age; only 60–80% of these survived the ten-day experimental period. In rats 33 days of age or older there was a marked decrease in the severity of the lesions, suggesting that the choline requirement of rats over 30 days of age is less than that for younger animals. In young female rats the results of choline deficiency appeared more slowly and were less severe than in male rats of the same age and weight. The increase in the weight of the kidneys in young male rats 20 days of age and 24–30 g. in weight after a seven-day period on diets containing suboptimal levels of choline, was proportional to the severity of the choline deficiency, and it is suggested that it may be possible to use this response of the kidneys to a lack of choline for the assay of this and related substances.

Administration of choline after the appearance of the haemorrhagic lesions accelerated the recovery of the animals from the acute stage of the deficiency.—R. ALLCROFT.

JUKES, T. H. (1940). **Effect of Choline and other Supplements on Perosis.**—*J. Nutrit.* **20.** 445–458.

A continuation of work previously reported [*V. B.* **11.** 53.] showed that choline is essential for the prevention of perosis in young turkeys and chicks. Experiments with a simplified diet also indicated that choline is essential for growth. Addition to the diet of 0·1% choline was sufficient for growth, but 0·2% was

necessary for prevention of perosis. Betaine was found to be neither growth-promoting nor anti-perotic and inositol was also ineffective; arsenocholine was also anti-perotic but not as effective as choline. It was found that an adequate supply of the vitamin B complex was necessary for the full anti-perotic effect of choline to be exerted. Investigation of various feeding stuffs showed that soybean meal prevented perosis at a level of 25% and partial protection was obtained with either 17% of sardine meal, 5% of dried pork liver or with 65% of barley. The relation of the lecithin content to the anti-perotic activity of feeding stuffs is discussed, as choline is present in lecithin and other phospholipids. [For the protective action of choline against haemorrhagic degeneration of the kidney, see *V. B.* **11.** 319.]—R. Allcroft.

Hogan, A. G., Richardson, L. R., Patrick, H., & Kempster, H. L. (1941). **Perosis due to a Vitamin Deficiency.**—*J. Nutrit.* **21.** 327–340.

An alcohol extract of liver was prepared which effectively prevented perosis in chicks when the amount of manganese in the diet was adequate. Maintenance on a diet deficient in Mn but supplemented with the alcohol extract did not prevent perosis although the degree of severity of the disorder was reduced. Observations on chicks of different breeds indicate that early maturing breeds are more susceptible to perosis. It appears that both Mn and the alcohol extract are necessary to eliminate entirely this abnormality. Increase in the amounts of iron, zinc, and aluminium in the diet had no effect on the incidence of perosis. The beneficial effect of addition of choline to the diet of chickens has been demonstrated [*V. B.* **11.** 251.], and Jukes has reported the prevention of perosis in turkeys and chicks by the addition of choline [see *V. B.* **11.** 58, and preceding abst.]. The effect of choline was therefore tried and found to have some perosis-preventing activity although the result was not as good as that obtained with the alcohol extract. It is still uncertain whether choline is identical with the active agent present in liver or in other effective natural foodstuffs.—R. A.

Penquite, R., Heller, V. G., & Thompson, R. B. (1940). **Investigations of the Cause and Prevention of Perosis.**—*Bull. Okla. agric. Exp. Sta.* No. 243. pp. 18.

A ration comprising maize, wheat, lucerne, meat and bone products, cod liver oil, and NaCl was found to produce perosis in 75–100% of all batches of chicks to which it was fed without supplement. This ration contained, by weight, 2·22% Ca, 1·28% P, 0·271% Mg and 0·00089% Mn. Replacement of the meat scraps and bone meal by casein rendered the ration quite satisfactory, but it again became productive of perosis if calcium phosphate were added, or if Ca or P alone were administered in some form. The feeding of a Ca supplement resulted in a marked diminution in blood inorganic P.

Aqueous extracts of rice bran, or the ash from large quantities of rice bran, were found to protect chicks against the effects of the basal ration, and it is concluded that the beneficial action was due to the high Mn content of these supplements. Too high a concentration of Mn in the diet, however, is known to decrease the viability and growth rate.

It is suggested that chemical analyses be made of rations which are productive of perosis under practical conditions, since the removal of other mineral constituents or the addition of Mn may each, in particular circumstances, be effective in preventing the disease.—A. N. Worden.

Wintrobe, M. M., Miller, J. L., Jr., & Lisco, H. (1940). **The Relation of Diet to the Occurrence of Ataxia and Degeneration in the Nervous System of Pigs.**—*Johns Hopk. Hosp. Bull.* **67.** 377–404.

In continuation of earlier studies [see *V. B.* **9.** 269.], 44 pigs three weeks old were reared on basal diets comprising casein, sucrose, lard, mineral mixture, cod liver oil and, in most cases, yeast, together with certain supplements. In 18 animals which received small quantities of yeast together with supplements of vitamin $B_1$, riboflavin, or nicotinic acid, ataxia developed and was accompanied by extensive degenerative lesions in the peripheral nerves, spinal ganglia, and posterior [dorsal] roots and dorsal funiculi of the cord. Six animals which received supplements of whole desiccated liver remained free from lesions, but of 12 animals which were provided with 6 g. yeast per kg. body weight, five only were similarly protected. Wheat-germ oil alone did not exert any protective action, but degenerative lesions appeared to be less extensive in two out of three animals to which a yeast filtrate factor was given. The identity of the protective factor present in liver, and apparently to a lesser degree in yeast, remains unknown.

In view of the length of time which elapsed in some cases before the onset of ataxia, and of the fact that extensive lesions sometimes developed in animals which showed only a slight disturbance of the gait, the authors suggest that the conclusion of CHICK *et al.* [*V. B.* **9.** 731.], *viz*, that liver filtrate factor is curative of the ataxia described, does not seem to be wholly justified, since their longest period of experiment was 22 weeks.—A. N. WORDEN.

HARRIS, L. J. (1940). **The Reality of Partial Deficiencies.**—*Lancet.* **239.** 539–540.

H. points out that there is a wide gap between the minimum diet (the amount needed to prevent well defined clinical symptoms of deficiency) and the optimum diet (the amount needed to promote fullest health), so that subnormal nutrition may be present even when there are no obvious physico-clinical signs. One of the best examples is subclinical nutritional anaemia among human beings. Numerous tests both on animals and on human beings illustrate the beneficial effect of increasing the intake from the bare minimum to the optimum. For example, in the rat, half a unit of vitamin $B_1$ may be enough to keep the animal alive and prevent symptoms of beri-beri but not to allow a normal gain in weight; one unit will permit only bare maintenance without active growth, two units moderate growth, and so on up to 30 units or beyond. Similarly with vitamin C, 0·5–1·0 mg. of ascorbic acid daily will prevent clinical signs of scurvy in a g. pig, but microscopic examination of tooth structure demonstrates that a considerably larger dose is necessary for normal functioning of the formative cells. Administration of the bare scurvy-preventing dose will not prevent almost total degeneration of odontoblasts after two weeks. Also much more than the minimal dose is needed to confer maximal protection against infection, to maintain the complement titre at a normal value, and to prevent lowered capillary fragility. In the same way, suboptimal intakes of vitamin D produce subclinical rickets; lowered assimilation of Ca and P produces minor bony defects, increased incidence of dental caries, and probably impaired muscular tone.

Evidence is given of the occurrence of undernutrition among human beings in Great Britain and the causes are discussed.—A. E.

SMITH, S. G. (1940). **The Importance of Recognizing Secondary Vitamin Deficiencies.**—*Amer. J. trop. Med.* **20.** 593–602.

Attention is drawn to the fact that many of the apparently conflicting results reported as a result of nutritional investigations have been due to a failure to appreciate the importance of secondary vitamin deficiencies and of the interdependence of the vitamins. Examples of this are cited from S.'s own work and from elsewhere in the literature, and particular attention is paid to the vitamin B complex, at least three components of which are collectively concerned in biological oxidative processes. Specific cases mentioned include :– the associated deficiencies which are found in rickets, beri-beri, and pellagra; a sebaceous gland atrophy in rats which responds to riboflavin when it has developed on a riboflavin-deficient diet but not when it has developed on a diet completely devoid of B vitamins, and which may occur also as a secondary deficiency in rats receiving diets deficient in vitamins A or $B_1$; the lowered ascorbic acid content of the organs of rats on various deficient diets, and the recent experiments of S. and her co-workers and of HARVEY *et al.* upon canine blacktongue [see *V. B.* **10.** 200 and 867].

The importance of administering foods rich in all the B vitamins to clinical cases of an apparently single B deficiency is stressed, although it is pointed out that acute deficiencies may fail to respond to oral therapy unless the primary deficient factor is administered parenterally.—ALASTAIR N. WORDEN.

WALD, G. (1939). **On the Distribution of Vitamins $A_1$ and $A_2$.**—*J. gen. Physiol.* **22.** 391–415.

Studies were made of the distribution of vitamin A itself and of vitamin $A_2$, the homologue of vitamin A found in certain fishes. There was an interesting correlation between the appearance of one or both of these substances in the eye tissues (in which they are connected with the "visual" pigments) and the habitat of the fish, but most of the livers of the 18 species examined were found to contain both vitamins irrespective of habitat. The difficulty is stressed of distinguishing spectrophotometrically between the compounds which the two substances form with antimony trichloride, as according to W. the spectral bands overlap, and it is stated that appropriate calculations, employing factors derived from previous estimations of known preparations, must be applied in order to assess the amount of each present in an oil.—A. N. WORDEN.

See also p. 649. BELASCO & MURLIN. **The Effect of Vitamins A and C on Experimental Hyperthyroidism.**

CARLSTRÖM, B., & HJÄRRE, A. (1939). Durch B-Avitaminose verursachte Mangelkrankheiten bei Militärpferden. [**Deficiency Diseases in Military Horses Caused by Avitaminosis-B**].—*Biederm. Zbl.* **11.** 121–129. [Abst. in *Brit. Chem. Physiol. Abstrs.* Dec. 1940. p. 914, copied *verbatim*. Signed: A. G. P.]

Symptoms of deficiency of vitamin-B among military horses receiving a hay-oats ration were corr. by supplements of dried yeast (50 g. per day per animal).

PATTON, J. W. (1941). **The Fundamental Role of Thiamin in Canine Nutrition.**—*Vet. Med.* **36.** 156–168.

It is reported that P.'s original observations [*V. B.* **9.** 885.] on the production of canine hysteria by feeding a vitamin $B_1$ deficient diet, and its relief by parenteral administration of crystalline vitamin $B_1$ hydrochloride, have been confirmed. It is considered that the condition produced was identical with that occurring in the field, and it is stated further that dog foods which have been incriminated in cases of hysteria have been found deficient in vitamin $B_1$ and have proved adequate when suitably supplemented. The implication of these findings is discussed.—ALASTAIR N. WORDEN.

BERRYMAN, G., & SCHLOTTHAUER, C. F. (1941). **Is Fright Disease an Avitaminosis?**—*N. Amer. Vet.* **22.** 34–38.

Four three-month-old puppies were fed upon a commercial dog food which had been autoclaved for five hours with little alteration to its initial pH value of 4·85. Although anorexia was noted in three cases after 30–40 days, hysteria did not develop. The anorexia responded to intramuscular injections of vitamin $B_1$ hydrochloride or to a change to a normal ration. Controls which were fed supplements of brewer's yeast remained normal, as did the fourth animal receiving the autoclaved diet alone.

Young dogs which were placed on vitamin $B_1$ deficient diets, the composition of which is not stated, developed anorexia, muscular weakness and other symptoms of $B_1$ deficiency, but hysteria did not develop even after a period of several months. The other symptoms responded to $B_1$ therapy.—ALASTAIR N. WORDEN.

GREEN, R. G., & EVANS, C. A. (1940). **A Deficiency Disease of Foxes.**—*Science.* **92.** 154–155.

A dietary disease occurring among silver foxes in captivity is described. It appears to be caused by feeding fish as 10% or more of the diet. Most outbreaks have occurred during the months from November to May and the mortality has varied from 1–37% of the total. The first evidence of disease usually appears from 3–6 weeks after fish has been added to the diet; the earliest symptom is anorexia, and after 7–10 days signs of neuralagic disturbances begin to appear. The most characteristic lesions are found in the central nervous system. Histologically they are of the nature of vascular changes which result in small diffuse haemorrhages; a degeneration of nerve cells, with a variable degree of neuroglial reaction, accompanies the vascular changes. In their histological appearance and distribution the lesions are the counterpart of those of Wernicke's polio-encephalitis of man. This disease in man has been shown to be due to a vitamin $B_1$ deficiency and a study of the diets which cure the disease described in foxes, as well as therapeutic trials with synthetic $B_1$, indicate that it is caused by a $B_1$ avitaminosis. It is suggested that the fish diet induces a $B_1$ deficiency which causes the characteristic pathology and the resultant symptoms.—R. A.

LYTHGOE, B., MACRAE, T. F., STANLEY, R. H., TODD, A. R., & WORK, C. E. (1940). **The Vitamin $B_2$ Complex of Liver: The Identity of the Liver Filtrate Factor with Pantothenic Acid.**—*Biochem. J.* **34.** 1335–1340.

Previous work indicated that crude liver extracts contained at least three factors, designated $\alpha$, $\beta$ and $\gamma$, of the vitamin $B_2$ complex required to ensure maximal growth in rats already receiving riboflavin, nicotinamide, and vitamin $B_6$ [see *V. B.* **10.** 867]. The present paper establishes the identity of factor $\alpha$ or the "liver filtrate factor" with pantothenic acid ($\alpha:\gamma$-dihydroxy-$\beta:\beta$-dimethylbutyryl-$\beta$-alanine). Experiments designed to effect the purification and isolation of the two remaining factors, which have been shown to be biological entities, are in progress. A synthesis of $\gamma:\delta$-dihydroxyvaleryl-$\beta$-alanine methyl is described. —ALASTAIR N. WORDEN.

UNNA, K. (1940). **Pantothenic Acid Requirement of the Rat.**—*J. Nutrit.* **20.** 565–576.

Rats maintained on a diet devoid of panto-

thenic acid but supplemented with the other factors of the B complex ceased to grow after 3–4 weeks and developed a deficiency syndrome characterized by loss of weight, appearance of scant coarse fur with rusty spots, " inflammation of the nose ", and blood-caked whiskers; at autopsy a large percentage of the rats were found to have numerous petechiae under the skin and adrenal cortical haemorrhages. A single dose of 800 $\mu$g. or daily feeding of 50 $\mu$g. of pantothenic acid produced a marked increase in weight in deficient rats, but the other deficiency symptoms disappeared only after prolonged administration. Prophylactic tests showed that the maintenance dose for optimal growth is approximately 8 $\mu$g. of pantothenic acid per rat per day. Liver concentrates of known pantothenic acid content were found superior in their growth-promoting effect to equal doses of pure pantothenic acid alone.
—R. ALLCROFT.

I. JUKES, T. H. (1939). **The Pantothenic Acid Requirement of the Chick.**—*J. biol. Chem.* **129.** 225–231.

II. DIMICK, M. K., & LEPP, A. (1940). **Relation of Pantothenic Acid to the Filtrate Fraction of the Vitamin B Complex.**—*J. Nutrit.* **20.** 413–426.

I. Biological assays on chicks demonstrated that pantothenic acid as prepared from liver by WILLIAMS *et al.* is identical with the filtrate (or chick antidermatitis) factor. Chemical properties were also investigated and found to be similar. It is estimated that the requirement of the chick for pantothenic acid is in the neighbourhood of 1·4 mg. per 100 g. of diet.

II. Experiments on chicks and rats showed that at least two unidentified factors belonging to the vitamin B complex are present in a concentrate prepared from rice bran [see also *V. B.* **11.** 52]. It is demonstrated that pantothenic acid is definitely identical with the chick antidermatitis vitamin but it does not appear to represent the whole of the factor referred to as the " filtrate factor ", since it does not produce as good a growth response as that obtained with rice-bran concentrate. Also pantothenic acid, although an important fraction of the rat " filtrate factor " or factor 2, does not constitute all of it; it promotes growth of rats, and cures minor factor 2 deficiency symptoms such as swollen eyelids and occasional skin eruptions, but a filtrate fraction low in pantothenic acid, prepared from a rice-bran concentrate, was shown to contain an unidentified factor necessary for the rat. Pantothenic acid appears to be an important component of the anti-grey hair factor but results show that it does not completely restore hair colour nor does it completely prevent greying [see also *V. B.* **11.** 121 and 253].

It is concluded that rice-bran concentrate contains a chick and a rat growth factor or factors in addition to the now recognized components of the vitamin B complex, *viz*, thiamin, riboflavin, pyridoxin, nicotinic acid, and pantothenic acid.—R. ALLCROFT.

I. DAFT, F. S., SEBRELL, W. H., BABCOCK, S. H., Jr., & JUKES, T. H. (1940). **Effect of Synthetic Pantothenic Acid on Adrenal Hemorrhage, Atrophy, and Necrosis in Rats.**—*Publ. Hlth Rep., Wash.* **55.** 1333–1337.

II. ASHBURN, L. L. (1940). **The Effect of Administration of Pantothenic Acid on the Histopathology of the Filtrate Factor Deficiency State in Rats.**—*Ibid.* 1337–1346.

I. Rats maintained for 52–84 days on a basic diet supplemented with thiamin, riboflavin, pyridoxin, nicotinic acid, and choline, but no pantothenic acid, developed haemorrhage, necrosis, atrophy, or marked fat depletion of the adrenal glands or a combination of these lesions. Daily doses of 100 $\mu$g. of synthetic pantothenic acid for 6–14 days prevented these lesions and had a curative effect on adrenals already damaged by the deficient diet. From these results it is assumed that a deficiency of pantothenic acid is at least one of the causes of adrenal lesions in rats on deficient diets.

II. A histological examination was made of the adrenals of the rats used in the experiments described in I and the pathological findings are discussed; the testes, spleen, pancreas, and tibiae were also examined for histological changes. One of the most noticeable differences between the adrenals of the group receiving the pantothenic acid and those of the control group deficient in pantothenic acid, was in their fat content, particularly in the fascicular zone; the group deficient in pantothenic acid showed marked to sub-total depletion of fat in this layer. There appears to be a close relationship between the functional state of the gland and its fat content. It is therefore evident that deficiency of pantothenic acid causes a partial or complete adrenal cortical insufficiency. The histological findings confirmed the results in I, *viz*, that addition of

pantothenic acid arrests and repairs the adrenal lesions resulting from a diet deficient in the filtrate factor. It was also found that abnormal testicular function and cartilage hypoplasia occurred in the rats deficient in pantothenic acid.—R. ALLCROFT.

HEGSTED, D. M., OLESON, J. J., MILLS, R. C., ELVEHJEM, C. A., & HART, E. B. (1940). **Studies on a Dermatitis in Chicks Distinct from Pantothenic Acid Deficiency.**—*J. Nutrit.* **20.** 599–606.

It has been demonstrated that pantothenic acid is the B complex factor responsible for the cure and prevention of chick dermatitis [see preceding absts.] but it is also known that lesions similar to those of dermatitis may be produced in chicks and other animals by the inclusion of raw egg-white in the ration. The anti-egg-white injury factor or vitamin H, has been investigated by GYÖRGY and co-workers [*V. B.* **11.** 553.] and recently shown to be similar to or identical with biotin. Experiments are now described in which dermatitis occurred in chicks receiving adequate supplements of pantothenic acid. The lesions usually appeared after about three weeks of maintenance on the basal ration; the bottoms of the feet became rough and calloused and were often severely affected before mandibular lesions were evident. As the syndrome progressed the entire bottom of the foot became encrusted and haemorrhagic cracks appeared; the toes sometimes became necrotic and sloughed off but the top of the foot and leg usually showed only a dry scaliness. The mandibular lesions spread from the corners of the mouth to an area round the beak and the eyelids became swollen and stuck together. In contrast to these symptoms, the lesions in pantothenic acid deficiency appear first in the corners of the mouth and seldom if ever do the foot lesions become as severe as those now described.

Complete protection was obtained with 2% kidney residue, and liver residue and brewer's yeast were found to be potent sources of the factor. It is probable that the protective factor may be identical with biotin or vitamin H since their properties are similar and potent preparations of vitamin H produced cures in three weeks when 35 $\mu$g. per day were injected into chicks.—R. ALLCROFT.

GYÖRGY, P., & POLING, C. E. (1940). **Further Experiments on Nutritional Achromotrichia in Rats and Mice.**—*Proc. Soc. exp. Biol., N.Y.* **45.** 773–776.

Using black rats and black mice maintained on a basal diet which produced greying of the fur in 3–5 weeks, it was demonstrated that pantothenic acid is only one, although probably the most important factor, in the prevention of nutritional achromotrichia. Daily doses of 50–100 $\mu$g. of calcium pantothenate produced quick and definite effects on the depigmentation of the fur, but addition to the diet of pantothenic acid for as long as six months did not completely prevent changes in the colour of the fur. When biotin was also added a rapid improvement was noted. Addition of biotin alone, or before administration of pantothenic acid, had no curative effect. It is concluded that biotin is an additional factor connected with the maintenance of the normal pigment of the fur in rats and mice. [See also *V. B.* **11.** 121 and 253.]—R. ALLCROFT.

MORGAN, A. F., & SIMMS, H. D. (1940). **Anti-Grey Hair Vitamin Deficiency in the Silver Fox.**—*J. Nutrit.* **20.** 627–635.

Greying of fur is reported in three young silver foxes maintained on a basal diet apparently adequate except for the absence of a yeast filtrate factor preparation; one animal died after 26 days and the other two lost most of their fur although they were on the deficient diet only 44 days. The new fur was light grey in colour. The pelts of the three control foxes which received the filtrate factor were normal. At autopsy large red-mottled thymuses were found in the three animals on the deficient diet, but no surviving thymuses were present in the controls. It is suggested that there is a possible relationship between nutritional and endocrine mechanisms. [See also *V. B.* **11.** 253.]
—R. ALLCROFT.

DAVIS, G. K., & FREEMAN, V. A. (1940). **Studies upon the Relation of Nutrition to the Development of Necrotic Enteritis in Swine. II. Nicotinic Acid, Yeast and Liver in the Prevention of Necrotic Enteritis in Young Pigs Fed Massive Doses of S. Choleraesuis.**—*Proc. 33rd ann. Meet. Amer. Soc. Anim. Prod. 1940.* pp. 316–323. [For part I, see *V. B.* **11.** 316].

In continuation of their earlier studies the authors investigated the effect of dosing pigs with a culture of *Salmonella suipestifer*; 40–100 ml. of a 48-hour meat-infusion broth culture were used. Animals aged 26–82 days were used, and the basal diet consisted of maize 78, tankage 10, lucerne 7, dried skim milk 5,

and mineral mixture 1·5. Daily supplements of either yeast, liver, or 100 mg. nicotinic acid were given to half the animals, the remainder being untreated.

In all cases there was a subsequent temperature rise and diarrhoea usually developed. In about half of the untreated cases the condition persisted, and in some cases the presence of a necrotic enteritis was confirmed by P.M. examination. There was no improvement in the response of the pigs which received the yeast, but only one of 12 pigs receiving the liver supplement failed to recover during the second week after dosing. The response of the nicotinic acid group was intermediate. As only one of 22 undosed control animals developed a necrotic enteritis (and this animal had also an intussusception of the small intestine) it is concluded that liver, and to a lesser extent nicotinic acid, are capable of protecting young pigs against large doses of *S. suipestifer*. The authors point out, however, that the effect appears to be due to the maintainance of the nutrition of the animal and of the integrity of the intestinal mucosa, rather than to a specific action against the organism concerned.

[In the experiments described above, the virulence of the infecting organism does not appear to have been high, and the groups of animals employed were small. Again, the relationship to practical conditions of these experiments conducted with animals of only 26 days of age is problematical.]—A. N. W.

I. Najjar, V. A., & Wood, R. W. (1940). **Presence of a Hitherto Unrecognised Nicotinic Acid Derivative in Human Urine.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 386–390.

II. Najjar, V. A., & Holt, L. E., Jr. (1941). **The Excretion of Specific Fluorescent Substances in the Urine in Pellagra.**—*Science.* **93.** 20–21.

I. A specific reaction in urine is described which is apparently dependent on the store of nicotinic acid in the body. It was noticed that when urine was adsorbed on zeolite and subsequently eluted with KCl, the eluate on treatment with NaOH developed a bluish fluorescence. The substance was not identified chemically but could be measured quantitatively by means of a fluophotometer. After ingestion of nicotinic acid the excretion of this substance in the urine increased, and it is suggested that in pellagra the excretion may be diminished or absent. The procedure for estimating the substance is given.

II. The urine of four pellagra patients and of two dogs with blacktongue was examined for the presence of the characteristic fluorescent substance described in I. None of this material was found in any of the urines examined. It was further observed that in a pellagra patient not only is there an absence of the urinary component which develops fluorescence on alkalinization, but there appears in the urine a substance which is not normally present and which gives a whitish-blue fluorescence without any alkali addition. It therefore appears that there are two criteria by which to characterize states of nicotinic acid deficiency :– (1) the disappearance of a normal substance which produces fluorescence on alkalinization, and (2) the appearance of an abnormal substance which is fluorescent without such treatment. The significance of these two fluorescent compounds in the urine is discussed.—R. Allcroft.

Pittman, M., & Fraser, H. F. (1940). **The Determination of V Factor in the Urine and Tissues of Normal Dogs and of Dogs with Blacktongue by the Use of** *Hemophilus parainfluenzae.*—*Publ. Hlth Rep., Wash.* **55.** 915–925.

The amount of V factor in certain tissues and the amount excreted in the urine of 11 dogs was determined by the growth-promoting action of the tissue extracts and of the urine for *H. parainfluenzae.* There was no decrease in the amount of V factor excreted by two dogs which were maintained on a diet deficient in nicotinic acid, and which developed blacktongue, nor did there appear to be any correlation between the amount of V factor excreted and the amount of nicotinic acid in the diet. But there was some correlation between the nicotinic acid intake and the amount of V factor in certain tissues of the dogs ; the liver, muscle, and heart of dogs with blacktongue contained less V factor than did the corresponding tissues of normal dogs ; the blood levels were not affected. These results agree with those of other workers [*V. B.* **10.** 456]. The amount of V factor in the liver, kidney, and muscle of seven normal rats was also determined.—R. Allcroft.

Dann, W. J., Kohn, H. I., & Handler, P. (1940). **The Effect of Pyrazine Acids and Quinolinic Acid on the V-Factor Content of Human Blood and Upon Canine Blacktongue.**—*J. Nutrit.* **20.** 477–490.

The results show that neither quinolinic acid nor the pyrazine acids increased the blood cell V-factor content when given orally to human beings in doses more than twice as large as the amount of nicotinic acid which causes at least a 50% increase; nor did any of the three acids cause a marked synthesis of V-factor when added to defibrinated blood *in vitro*.

Experiments with dogs showed that in cases of blacktongue none of the other acids exerted more than a fraction of the activity of nicotinic acid; 20 mg. quinolinic acid daily was preventive whereas 0·15 mg. nicotinic acid daily is sufficient to prevent blacktongue.—R. A.

GYÖRGY, P., & ECKARDT, R. E. (1940). **Further Investigations on Vitamin $B_6$ and Related Factors of the Vitamin $B_2$ Complex in Rats. Parts I and II.**—*Biochem. J.* **34.** 1143–1154.

I. The incorporation of 10% dried, heated egg-white in the basal diet deficient in vitamin $B_6$ increased the incidence of skin lesions in rats.

II. It is evident that factors of the vitamin $B_2$ complex other than riboflavin, vitamin $B_6$, and choline are necessary for the maintenance of a normal skin condition in rats [see also *V. B.* **10.** 956]. Animals which developed the syndrome which G. terms acrodynia responded only transitorily to vitamin $B_6$, and subsequently developed various types of skin lesions and of pigment changes in the fur.—A. N. W.

UNNA, K. (1940). **Studies on the Toxicity and Pharmacology of Vitamin $B_6$ (2-Methyl-3-Hydroxy-4, 5-Bis-(Hydroxymethyl)-Pyridine).**—*J. Pharmacol.* **70.** 400–407.

The L.D. 50 of vitamin $B_6$ hydrochloride in rats is 3·7 g. per kg. following subcutaneous injection and 5·5 g. per kg. following oral administration; doses above 1 g. per kg. cause impairment of co-ordination and tonic convulsions. Daily administration of 20–25 mg. per kg. over 80 days failed to produce any toxic effects or pathological changes in the organs. The urine of healthy men and dogs contained less than 0·5 $\mu$g. of vitamin $B_6$ per c.c.
—J. M. ROBSON.

TODHUNTER, E. N., & BREMER, W. (1940). **The Ascorbic Acid, Phosphatase and Calcium Content of the Blood of Guinea Pigs with Varying Degrees of Scurvy.**—*Amer. J. Physiol.* **130.** 310–318.

Groups of young g. pigs were fed a vitamin C deficient diet supplemented by different amounts of ascorbic acid. There was no measureable quantity of ascorbic acid in the plasma of animals which received the basal diet alone, but the ascorbic acid content of the plasma of animals receiving the supplements was found to be a reflection of the dietary intake; thus, a mean value of 0·54 mg. per 100 ml. was found in a group of which the members had each received daily supplements of 8 mg. ascorbic acid over the 34-day experimental period, and a mean of 0·22 mg. per 100 ml. was found in a comparable group in which the individual daily intake had been 2 mg. In paired-feeding experiments, in which animals receiving 8 mg. per day of ascorbic acid were allowed only the same food intake as pair-mates receiving the basal diet alone, the plasma ascorbic acid values of the animals receiving the supplement ranged from 0·31–0·41 mg. per 100 ml.

Serum phosphatase activity was markedly decreased in severe scurvy, but serum Ca values were unchanged.—ALASTAIR N. WORDEN.

I. WOOLLEY, D. W. (1940). **A New Dietary Essential for the Mouse.**—*J. biol. Chem.* **136.** 113–118.

II. WOOLLEY, D. W. (1940). **The Nature of the Anti-Alopecia Factor.**—*Science.* **92.** 384–385.

I. Evidence is presented which indicates that the mouse requires a hitherto undescribed vitamin for normal growth and maintenance of hair. After about four weeks on a described basal ration, growth ceased and many of the animals became hairless. The hair on the entire body with the exception of the head, tail, and occasionally the legs, fell out abruptly leaving the trunk naked. As the disease progressed, the denuded area became scaly and then reddened and ulcerated. A normal appearance was regained in 3–7 days after administration of a protective concentrate found in certain fractions of liver extract. The active substance in these fractions is relatively insoluble in alcohol, is non-dialysable and has not been identified with any previously described vitamin. It is proposed that this factor be called the mouse anti-alopecia factor.

II. Many of the properties of the mouse anti-alopecia factor suggested that a phosphoric ester of inositol was involved. Trials with phytin and inositol itself showed that both these substances caused restoration of hair and resumption of growth in the depleted animals. Cures were obtained with 10 mg. of inositol per 100 g. of ration. These facts indicate that

the mouse anti-alopecia factor is inositol or its derivatives.—R. ALLCROFT.

REID, J. (1941). **Prothrombin Deficiency in Disease of the Liver and Bile Passages and its Treatment with Synthetic Vitamin K.**—*Brit. med. J.* April 19th. 579–584.

Deficiency of vitamin K leading to a prothrombin deficiency as a cause of haemorrhage in hepatic and biliary diseases associated with jaundice is discussed, and case records are reported demonstrating the relationship. The investigations confirm previous work indicating that defective absorption of vitamin K due to absence of bile salts in the intestine is the main factor responsible for prothrombin deficiency in obstructive jaundice and biliary fistula prior to operation. Prothrombin deficiency in cirrhosis of the liver is considered to be due to imperfect utilization of vitamin K by the liver. It is suggested that prothrombin estimations may form the basis of an additional test of hepatic insufficiency. A comparison is made between haemorrhage in jaundice and haemophilia, both of which are caused by an upset in the coagulation mechanism, due in the former to prothrombin deficiency and in the latter to an unknown congenital defect.

A new water-soluble preparation (2-methyl-1 : 4-naphthohydroquinone disuccinate) for intravenous injection in cases of prothrombin deficiency is described, and trials indicate that it is as efficient and more rapid than 2-methyl-1 : 4-naphthoquinone but its action is less sustained than that of the latter.

A method for the quantitative estimation of prothrombin in blood is described, together with a method of preserving lung extract as a source of thrombokinase.—R. ALLCROFT.

DAY, P. L., LANGSTON, W. C., DARBY, W. J., WAHLIN, J. G., & MIMS, V. (1940). **Nutritional Cytopenia in Monkeys Receiving the Goldberger Diet.**—*J. exp. Med.* **72.** 463–477.

The authors have continued their studies on the effects of feeding purified diets to rhesus monkeys, and the present paper comprises a report on 17 animals which were provided with a modified Goldberger diet that had previously been employed to induce anaemia. Monkeys which received the unsupplemented basal diet developed leucopenia, anaemia, gingivitis and diarrhoea, and died if no treatment was given. *Bacterium flexneri* was isolated from the stools of several such animals. A few cases exhibited facial oedema. A single monkey which received the basal diet supplemented by ascorbic acid and by crude liver extract grew well and maintained a normal blood picture over a period of nearly two years. The liver extract was also effective in restoring an affected animal to normal, but liver ash was ineffective. Ascorbic acid, vitamin $B_1$, nicotinic acid, and riboflavin were all ineffective in curing the condition, although the combination of nicotinic acid and riboflavin appeared to have a definite erythropoietic effect. It is therefore apparent that some unknown substance or substances (" vitamin M ") present in liver is essential to the health of young monkeys.—A. N. WORDEN.

## PUBLIC HEALTH

I. LINDFIELD, A. (1941). **Problems of Food Inspection in War-time.**—*J.R. sanit. Inst.* **61.** 123–132.

II. TAYLOR, H. T. (1941). **Food Inspection in War-time.**—*J. R. sanit. Inst.* **61.** 133–135.

I. The procedure adopted under war-time conditions for centralized slaughtering is detailed, and the position of local authority inspectors is discussed in relation to meat inspection in abattoirs.

The increased attention paid to cleanliness in the preparation and handling of carcasses in the abattoir is commended, but criticism is expressed concerning the handling of meat after it has left the abattoir.

Damage to foodstuffs by enemy action is discussed, broken glass being apparently the greatest danger. To reduce risk from exposure to possible damage necessitates the constant moving of foodstuffs in and out of cold store, which is detrimental to keeping qualities.

With regard to milk, the shortage of feeding stuffs reduces yields and this, together with lack of ventilation and insufficient lighting in cowsheds owing to black-out regulations, may result in more cows being slaughtered for meat. L. suggests, however, that younger and more healthy stock may be retained and that the incidence of TB. may then fall sharply.

II. Since the introduction of centralized slaughtering, some abattoirs are killing in

excess of their capacity and in consequence efficient meat inspection is hampered. As the establishments are operated by the State, local authorities have difficulty in the enforcement of local bye-laws.

In order to conserve meat and milk supplies, in-calf cows, heifers, and young calves should not be slaughtered.

Difficulty is experienced in the ventilation of cowsheds consequent upon blackout restrictions.

The purchase of foods for sampling under the Food and Drugs Acts is very materially limited since rationing precludes the unrestricted purchase of rationed foodstuffs and other foodstuffs are often sold only to persons registered for rationed foodstuffs.

A plea is made for the better protection of foods against possible gas attacks.—H. E. B.

CASTELO, M., & SALSAMENDI, R. (1939). Investigación de microorganismos del genero Salmonela en productos alimenticios de origen animal. [**Salmonella in Foodstuffs of Animal Origin**].—*Bol. mens. Direcc. Ganad., Montevideo.* **23.** 4–8.

The authors examined 302 samples of foodstuffs of animal origin for the existence of bacterial contamination, with special reference to salmonella. The foodstuffs included cooked and raw hams, sausages, meat pastes, etc., all containing bovine or porcine flesh. *S. newington* was isolated from one sample of smoked pork and *S. anatum* from a pork sausage.

Other organisms found were staphylococci, streptococci, *Proteus*, *Pseudomonas*, and *Bacillus anthracoides*. No anaerobes were identified.
—MILLER WATSON.

SMITH, H. R. (1940). **Beef Liver Condemnations.**—*Proc. 33rd ann. Meet. Amer. Soc. Anim. Prod. 1940.* pp. 272–276.

Condemnations of bovine livers, resulting from federal inspection, represent the loss of approximately two million dollars per annum and, since livers are now used for the treatment of anaemia, the loss is not negligible.

Condemnations in 1940 amounted to 5·3% for abscesses, 1·4% for distomatosis, 2% for telangiestasis (angioma) and 0·97% for "sawdust" livers (livers containing numerous minute spots).

The knowledge concerning the aetiology of abscessed beef livers is incomplete; statistics showing traumatism as the cause are small. The highest percentage of such livers was in cattle slaughtered in Colorado, Chicago, and Nebraska. Apparently beet pulp and tops are fed in those states more than elsewhere. This may point perhaps to a surplus of sugar overburdening the liver, thus weakening its structure and allowing the entrance of pyogenic bacteria.

No conclusions have been reached, but questionnaires have been distributed and studies instituted into the aetiology of the various conditions.—H. E. BYWATER.

KRANEVELD, F. C., & ERBER, M. (1940). Het voorkomen van Salmonella typhi murium in eendeneieren. [*S. typhimurium* **in Duck Eggs**].—*Ned.-ind. Bl. Diergeneesk.* **52.** 146–152. [English and French summaries]. [English summary amended].

*S. typhi-murium* was isolated from eight out of 300 fresh duck eggs in the vicinity of Buitenzorg. In view of the danger to man, widespread investigations are required into the occurrence of the infection in ducks in the Dutch East Indies.

NORDBERG, B. K. (1940). Ladugårdshygieniska spörsmål. [**Cow Byre Hygiene Problems**].—*Beretn. 5. nord. Vet.-mode, Kbh., 1939.* pp. 539–556. [In Swedish: German summary].

N. describes the hygienic conditions of the farms which supply milk to Helsinki, Finland. Supervision by the milk control station has reached a high level of completeness as, in addition to tests on milk, the farms are regularly inspected, the buildings and animals by veterinarians and the dairy personnel by doctors. The dairy farms are classified into four grades, *viz*, model class and classes I, II, and III, of which the last is unsatisfactory. In 1935, 0·18% of the farms were of the model class, 2·1% in class I, 52% in class II, and 45·7% in class III. In 1939 the figures were respectively 0·54%, 15%, 67·4%, and 17%, showing that a great improvement had taken place particularly at the lower end of the scale. Model class and grade I milk is sold at a higher price than the rest. Free tuberculin testing is regularly carried out. A great improvement in hygienic conditions was effected by the stimulus of advice by inspecting veterinarians on such matters as white-washing, flooring, milker's clothes, milking methods, care of utensils, and milk-cooling methods. A table shows the progress made on these points from 1934–38.

N. investigated the ventilation of byres at

three model farms, analysed the $CO_2$ and $NH_3$ content of the air, and recorded the temperature and humidity. The results did not bring out any points of great importance. It appeared that a manure heap close to a byre added slightly to the $CO_2$ and $NH_3$ content of air in the byre. [Work on class III byres might give more interesting results.]—J. E.

SIM, R. P., & FLINN, F. B. (1939). **A Study of the Hazard from Tubercle Bacilli in Environmental Air.**—*Amer. J. Hyg.* Sect. B. **30.** 135–140. [Authors' summary copied *verbatim*].

1. The use of a saline solution in the Wells centrifuge will not permit the collection of tubercle bacilli in the atmosphere. 2. Tubercle bacilli, because of their size, tend to fall out of the atmosphere rapidly. 3. Tubercle bacilli, when expelled from the mouth, are contained in albuminous material which tends to stick to whatever object it strikes and are not stirred up again into the atmosphere.

## THERAPEUTICS

MANDELBAUM, M. (1941). **Action of Sulphonamides and their Derivatives on Bacteria. [Correspondence].**—*Nature, Lond.* **147.** 266–267.

Certain organisms (*e.g. Bacillus subtilis, B. mycoides,* and *B. mesentericus*) exhibit a pelliculous growth on the surface of a liquid culture medium. This is inhibited by sulphonamides in low concentrations (1 : 50,000–1 : 100,000), *i.e.* concentrations which do not inhibit the growth of the organism. Moreover, the degree of inhibition of pellicle formation is parallel with the degree of inhibition of spore formation. The effect on pellicle formation of various sulphonamides runs parallel with their anti-bacterial activity *in vivo*. The effect of sulphanilamide on pellicle formation is inhibited by *p*-aminobenzoic acid.—J. M. R.

GÖTZE, R. (1939). Klinische und experimentelle Prüfungen des Sulfanilamidpräparate Prontosil, Prontalbin und Astrosol. II. Mitteilung: Schwangerschaftsstörungen und infizierte Geburten beim Schwein. III. Mitteilung: Heilversuche bei Abortus infectiosus Bang an spontan und künstlich infizierten Rindern. **[Clinical Trials of Sulphonamides, Prontosil, Prontalbin and Astrosol. II. Diseases of Pregnancy and Parturition in Swine. III. Attempts to Cure Natural and Artificial Cases of Bovine Brucellosis].**—*Dtsch. tierärztl. Wschr.* **47.** 697–700 and 729–731. [For part I, see *V. B.* **11.** 556].

II. Favourable results were obtained in cases of placental infections observed in pigs during the later stages of pregnancy by the subcutaneous injection of sulphonamides (astrosol or prontosil given two or three times a day). In some cases normal parturition occurred while in others the foetuses were delivered by Caesarean section. In some cases the sulphonamide was administered orally in milk.

III. Large doses of the sulphonamides were given in seven cases of bovine brucellosis, three occurring naturally and four which were experimentally infected. The results were unsatisfactory and do not suggest that the treatment is of value. G. suggests that further experiments with protalbin given orally are desirable.—J. M. ROBSON.

HAMPIL, Bettylee, WEBSTER, G. W., & MOORE, M. L. (1941). **Chemotherapeutic Activity of $N^4$-Acylsulfanilhydroxamides.**—*J. Pharmacol.* **71.** 52–58.

Fourteen members of a series of $N^4$-acylsulphanilhydroxamides and four related compounds have been tested for chemotherapeutic activity. The *n*-valeryl, *n*-hexanoyl and *n*-heptanoyl compounds are effective against streptococcal and meningococcal infections in mice. $N^4$-hexanoylsulphanilhydroxamine is absorbed more slowly than sulphanilamide and sulphapyridine and its concentration in the blood is lower.—J. M. ROBSON.

DELAFIELD, M. E., STRAKER, E., & TOPLEY, W. W. C. (1941). **Antiseptic Snuffs.**—*Brit. med. J.* Feb. 1st. 145–150.

Penicillin (1%) and sulphathiazole (10%) administered as snuffs, markedly decreased the number of staphylococci in the nose in nasal carriers of these organisms. Sulphathiazole also had a dramatic effect on the nasal content of diphtheroid bacilli. The results obtained with a proflavine snuff (5%) were very variable. The authors conclude that snuffs (sulphathiazole, penicillin) may prove of value as a prophylactic against bacterial infection of the upper respiratory tract. They will not prevent or cure the common infectious cold, but may

favourably affect its course by preventing secondary infection.—J. M. ROBSON.

FARRELL, L. N. (1940). **Appraisal of Therapeutic Agents in Experimental Staphylococcal Infection.**—*Brit. J. exp. Path.* **21.** 302–310.

Staphylococcus antitoxin, as concentrated for human use, was found to be effective in neutralizing the toxin produced *in vitro* by 5 average lethal doses of toxigenic strains of living culture. Sulphapyridine alone did not modify the lethal effect of 5 A.L.D. of the toxigenic strains. Mice protected with antitoxin against the toxaemia developed by test culture were enabled by treatment with sulphapyridine to overcome the otherwise fatal effects and survive in spite of the development of local abscesses in the liver, spleen, and kidneys. Sulphathiazole, sulphamethylthiazole, and sulphapyridine were found to be equally effective chemotherapeutic agents under the experimental conditions described.—J. M. R.

HALL, W. K., FADER, D. E., & DECHERD, G. M. (1940). **A Simple Method of Preparing Dried Serum Proteins for Therapeutic Use.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 390–392.

Adopting the method of HARTLEY (1925) for the preparation of dry and lipid-free immune sera the authors prepared dried serum proteins from dogs. Saline solutions were then injected intravenously into three dogs, one receiving the equivalent of 2 g. of serum proteins, another a similar amount of proteins from another serum, and a third 5 g. of proteins derived from two other sera.

No ill-effects occurred. Preparations of human serum proteins were prepared from sera of appropriate blood type, and 40 c.c. of a solution containing 4 g. of protein were injected into a human patient. No reaction was apparent.—H. V. HUGHES.

RAKE, G., & MCKEE, C. M. (1940). **Action of Sulfathiazole and Sulfamethylthiazole on** *Staphylococcus aureus.*—*Proc. Soc. exp. Biol., N.Y.* **43.** 561–564.

In *in vitro* experiments with *Staph. aureus*, sulphamethylthiazole showed greater bacteriostatic activity than sulphathiazole; sulphapyridine was even less active. In *in vivo* experiments sulphapyridine had little, if any, activity. Both sulphathiazole and sulphamethylthiazole protected mice against *Staph. aureus*, the former drug being slightly more active than the others.—J. M. ROBSON.

RIGDON, R. H., HAYNES, A., & LIPSCOMB, A. (1941). **Effect of Sulfapyridine on Staphylococcus Toxin. An in Vivo Study in the Rabbit.**—*J. Lab. clin. Med.* **26.** 1111–1115. [Authors' conclusions copied *verbatim*].

Sulfapyridine does not inhibit the lethal action of staphylococcus toxin in the rabbit.

Rabbits given an intravenous injection of 50 per cent dextrose and thirty minutes later staphylococcus toxin survive for a longer time than those animals given only staphylococcus toxin.

HEISE, F. H., & STEENKEN, W., Jr. (1940). **Sulfapyridine in Experimental Tuberculosis in Guinea Pigs.**—*Amer. Rev. Tuberc.* **42.** 801–804.

Growth of tubercle bacilli *in vitro* is partially inhibited by high concentrations of sulphapyridine (80 mg. %). Inhalation TB. in g. pigs produced by relatively small doses was not inhibited by sulphapyridine in blood concentrations of 6·5–10 mg. % maintained five months after infection.—J. M. ROBSON.

HESSE, E., & MEISSNER, G. (1940). Studien zur Chemotherapie der Tuberkulose. VI. Mitteilung. Die Wirkung des Silogran. [**Chemotherapy of TB. VI. Treatment with Silogran**].—*Dtsch. med. Wschr.* **66.** 407–408. [Abst. in *Brit. Chem. Physiol. Abstr.* Jan. 1941. p. 37, copied *verbatim*. Signed: A. S.]

Oral administration of ethyl silicylricinoleate (0·5 c.c. per kg. body wt. per day) accelerates the formation of scar tissue in the lungs of rabbits infected with bovine tubercles.

I. STEINBACH, M. M., & KLEIN, S. J. (1941). **Vitamin C in Experimental Tuberculosis.**—*Amer. Rev. Tuberc.* **43.** 403–414.

II. STEINBACH, M. M., KLEIN, S. J., & DUCA, C. J. (1941). **The Effect of Vitamin C on Experimental Tuberculosis in the Rabbit.**—*Ibid.* 415–417.

I. The effects of vitamin C, alone and in conjunction with increasing doses of tuberculin, on the course of acute and chronic experimental TB. were studied in g. pigs maintained on a basic diet which supplied an adequate intake of vitamin C; the relation of C to tuberculin shock was also investigated. Daily injections of additional crystalline ascorbic acid reduced the percentage of deaths due to tuberculin shock from 81 to 18, and raised the tissue levels of ascorbic acid in tuberculous g. pigs, in which there is apparently a greatly

increased demand for the vitamin. Treatment with ascorbic acid appeared to retard the progress of the disease, and combined administration of tuberculin and ascorbic acid gave better results than the use of either alone in both chronic and acute cases, although the combined therapy was not better than the vitamin therapy alone when tuberculin was used in repeated large toxic doses. These results suggest the use of ascorbic acid in conjunction with tuberculin in attempts at therapeutic desensitization.

II. Similar experiments to those in I were undertaken on rabbits which, unlike g. pigs, are able to synthesize their own vitamin C. The results showed that the course of the disease was not influenced by the administration of ascorbic acid alone or combined with tuberculin, even though a 50% increase of the ascorbic acid content of the adrenals was produced. Nor were the vitamin C levels of the tissues lowered in tuberculous rabbits as they were in g. pigs.—R. ALLCROFT.

SHANKS, P. L. (1941). **M & B 693 in the Treatment of Fowl Cholera.**—*Vet. Rec.* **53.** 85.

A small clinical experiment on a flock of 22 turkeys infected with fowl cholera suggests that treatment with M & B 693 is of value.—J. M. R.

STEYN, H. P. (1940). **A Report on the Treatment of an Outbreak of Strangles with Sulphanilamide.**—*J. S. Afr. vet. med. Ass.* **11.** 49–60.

Seven cases of strangles in horses are described in which treatment with sulphanilamide was undertaken. S. discusses the dosage and methods of administration of the drug and the toxic symptoms which may follow its administration. A rapid fall of temperature and marked improvement resulted from the treatment and there was practically no abscess formation. Very much smaller doses were used than are usually recommended, the total amount for each horse varying from 90–300 g. Dosing was *per os* in the form of an electuary.—E. M. R.

I. STEFFAN, H. (1939). Zur Lokalbehandlung der Druse. [**Local Treatment of Strangles**].—*Z. Veterinärk.* **51.** 217–226.

II. SALLERMANN, H. (1939). Kritische Bemerkungen zur Druse-Frage. [**Notes on Strangles**].—*Vet.-med. Nachr. Bayer-Meister Lucius.* No. 2. pp. 25–33.

I. This is a preliminary account of the local treatment of strangles in army horses by spraying the naso-pharynx with chloramine. A 2% solution is heated to 40° C. and introduced by a nasal spray catheter passed in the same way as a stomach tube. The treatment was given as early in the course of the disease as possible and repeated after 2–3 days. The results of the treatment in 18 animals were favourable, a striking fall in temperature (104° F. to normal) often resulting within two days. When a second attack of pyrexia occurred the treatment was repeated with success. No untoward sequelae were observed, even when a little of the solution entered the trachea.

II. This is a general review of strangles in horses, with special reference to the severe form of the disease which is common in East Prussia. As many as 50–90% of young horses at remount depots may contract the disease. The general incidence among army horses of all ages at 14 centres was 0·69%. The failure of anti-streptococcal serum even when given early in the disease, and the difficulties encountered in preparing effective sera are mentioned. The use of vaccines has not as a rule been of much value. Further research is needed on the types of *Streptococcus equi* causing various outbreaks of the disease and on the preparation of potent sera.—E. G. WHITE.

VÖHRINGER, K. (1939). Beitrag zur Starrkrampfbehandlung. [**Treatment of Tetanus**].—*Berl. Münch. tierärztl. Wschr.* Aug. 18th. 517–522.

A review is given of the literature dealing with the treatment of tetanus in the horse. Serum therapy alone, using very large doses, is so expensive as to be practicable only with very valuable animals. Different authors record a varied degree of success. Narcosis has been suggested as a form of therapy. A variety of chemical substances has been credited with some success; magnesium sulphate, phenol, sodium bicarbonate, and lobelin have been used by different observers. A combination of serum therapy and narcosis is used in human medicine and some success is claimed for it in the horse. Serum therapy has also been combined with the use of some of the chemical agents referred to as well as with other substances. Records refer usually, however, to single cases and references to series of animals treated by a single method are rare.

The author has treated 11 cases of tetanus in horses. Eight were given antitoxin (50,000–100,000 units) intravenously, $NaHCO_3$ (1 litre

of 7% solution) i/v, chloral hydrate (10–30 g.) i/v, and caffein i/v. Of the animals treated with this combined method, seven recovered. Three additional cases were given the treatment without antitoxin and two of them died.

These results are favourable when compared with those recorded by others. The reasonable cost of the treatment is also of importance.

—E. G. WHITE.

McCULLOCH, E. C., & FULLER, S. A. (1941). **The Relative Efficiencies of Disinfectants in Killing Erysipelothrix rhusiopathiae.** —*Amer. J. vet. Res.* **2.** 77–83.

The authors tested phenol, liquor cresolis compositus, lysol, aseptogen, formalin, lye, drene (triethanolammoniumlauryl sulphate), household soap, iodine solution, hypochlorites, alcohol, and hydrogen peroxide for their disinfectant power against E. *rhusiopathiae*. The hypochlorites were found to be the most efficient, being effective in solutions corresponding to 1 : 12,500–1 : 11,000 of chlorine, but household lye, containing approximately 98% sodium hydroxide, which is effective in dilutions of 1 : 333–1 : 500, is recommended as being odourless, non-toxic to animals when consumed in moderate amounts, and not markedly caustic to the skin. A solution of 1 : 150 is recommended for general use. Formalin and hydrogen peroxide were found to be quite ineffective, while all the other compounds tested had a moderately effective action.

Salt solutions were also tested for their effect on *E. rhusiopathiae*, because the survival of the organism in brines and salted meats may have a bearing on its dissemination; the organisms were found to be still alive after 88 days in a 30% salt solution when kept in a refrigerator at temperatures varying from 30°–40° F.

YUTUC, L. M. (1940). **The Chemotherapy of Surra in the Philippines Together with the Results Obtained in British North Borneo: A Critical Review.**—*Philipp. J. anim. Indust.* **7.** 303–313.

Y. enumerates the many drugs that have been used in the treatment of equine surra. Of these only arsenophenylglycerin, etharsanol alone or combined with tartar emetic, mercuric iodide and tartar emetic, and naganol alone or combined with either etharsanol or tartar emetic and its derivatives yielded satisfactory results. Naganol and its combinations gave the best results, and from recent observations it may also prove to be of great value as a prophylactic agent. The disparity in the response to drug treatment reported from various countries may be attributed to a natural resistance having developed as a result of prolonged exposure to the disease, *e.g.* in India, where a high percentage of recoveries under chemotherapy is recorded.—M. L. BINGHAM.

VIERTHALER, R. W. (1939). Die Bedeutung kleinster Germaninmengen im Kaninchenblut als Schutz gegen eine Infektion mit Trypanosoma brucei. [**The Importance of the Slightest Amount of Germanin in Rabbit Blood as Protection against *T. brucei* Infection**].—*Zbl. Bakt. I. (Ref.).* **133.** 496. [Also appeared in *Berl. Münch. tierärtzl. Wschr.* June 30th. 419. (1939)].

The Dangerfield, Gaunt and Wormall modification of the Lang method was found to give reliable results in the estimation of germanin, provided that a blank estimation could be made immediately before the germanin estimation; 0·5 mg. % can be measured. The minimal effective dose of germanin in the blood is about 1·3 mg. %.—J. M. ROBSON.

BUNTING, C. H., & LONGLEY, B. J. (1940). **The Morphological Changes in the Kidney of the Rat During Establishment of Tolerance to Tryparsamide.**—*J. Pharmacol.* **69.** 171–176.

Rats were injected intravenously with 1,000 mg. doses of tryparsamide per kg. body weight. This dose was increased by 500 mg. per week over a period of four weeks and one rat was killed every day. The kidneys were fixed in formalin and stained with haematoxylin and eosin prior to microscopic examination.

The outstanding lesion in early cases was coagulative necrosis of groups of tubules (usually the second convoluted) in the cortical area. As the experiment progressed evidence of injury became less. The tubule showed remarkable and speedy powers of regeneration and new cells were able to withstand large doses of the drug. The authors suggest that as the glomerulus and its efferent tubule were only slightly affected, the toxic effect of the arsenic occurs only when the urine has been concentrated by reabsorption of water.—C. W. O.

ADAMS, A. R. D., & WARRINGTON YORKE. (1940). **Studies in Chemotherapy. XXV. —A Second Case of Indian Kala-Azar Treated with 4 : 4′-Diamidino Stilbene.** —*Ann. trop. Med. Parasit.* **34.** 173–174.

A description of the apparent cure of a second case of Indian kala-azar by treatment with an aromatic diamidine, *viz*, 4 : 4′-diamidino stilbene. [See also *V. B.* **11.** 58].—R. A.

ADLER, S., & TCHERNOMORETZ, I. (1940). **The Action of 4 : 4′-Diamidino Stilbene on Various Piroplasms.**—*Ann. trop. Med. Parasit.* **34.** 199–206.

In doses up to 10 mg. per kg. the drug had no therapeutic action on *Theileria annulata*, *Anaplasma marginale*, and *Anaplasma ovis*. In doses of 2–4 mg. per kg. the drug was effective in infections of *Babesia ovis* in goats and *Babesia bigemina* in calves. In the latter case the drug does not cause complete eradication of the parasite, which is a great advantage in endemic areas.—J. M. ROBSON.

VOGELSANG, E. G., GALLO, P., & LORETO, F. de A. (1939). Coccidiosis de los conejos. Tratamiento por "atebrina" intravenosa. [**Atebrin Treatment of Rabbit Coccidiosis**].—*Rev. Med. vet. Parasit., Caracas.* **1.** 85–87.

The authors treated cases of rabbit coccidiosis with intravenous injections of a 1% solution of atebrin. Adult rabbits received 1 c.c. and young rabbits 0·5 c.c. in daily doses. After the fourth injection there were no oocysts in the faeces. Examination of faeces one month after treatment revealed no oocysts. Most of the rabbits received four doses before oocysts disappeared from the faeces, but in two cases eight injections were given.—MILLER WATSON.

TIERNO N'DAO (1939). Remarque sur un nouveau traitement de la lymphangite epizootique. [**A New Treatment for Epizootic Lymphangitis**].—*Bull. Serv. zootech. Epiz. A.O.F.* **2.** No. 3. 21–22.

Two cases of epizootic lymphangitis were successfully treated by STEWART's method [see *V. B.* **10.** 307.] of daily intravenous injections of an aqueous solution containing 1% resublimated iodine and 6% potassium iodide. Recovery was rapid in each case.—ALASTAIR N. WORDEN.

MORRIS, M. L., & MURRAY, T. J. (1940). **Treatment with Sulfanilamide of Meningo-Encephalitis Associated with Canine Distemper.**—*J. Amer. vet. med. Ass.* **96.** 80–86. 1 appendix.

Thirty dogs affected with the meningo-encephalitis which frequently develops as a complication of canine distemper infection were treated orally or subcutaneously with sulphanilamide. Blood levels of sulphanilamide were assessed throughout, and the dosage was adjusted in order to maintain the concentration of the drug at not less than 15 mg. per 100 ml. Twenty-three animals recovered, and of the seven which died it was considered that five succumbed to sequelae other than meningo-encephalitis. All the animals exhibited an increased percentage of segmented neutrophiles and a decreased percentage of lymphocytes before treatment was commenced, but the blood picture returned to normal during successful treatment.

This complication of canine distemper is universally regarded as being highly fatal, and the authors state that they have never previously successfully treated such cases.

—ALASTAIR N. WORDEN.

COULSTON, F., & MANWELL, R. D. (1941). **Successful Chemotherapy of a Virus Disease of the Canary.**—*Amer. J. vet. Res.* **2.** 101–107.

Forty cases of canary pox were treated with mercurochrome; of 20 treated in the early stages, and 8 treated in a fairly advanced stage, all recovered, and of 12 treated at a very advanced stage, 5 recovered and death was delayed beyond the usual time in the other 7 cases; in the experience of the authors the disease is uniformly fatal without treatment. Six birds which had recovered after treatment were tested for immunity by injection of large doses of virus and found to be refractory.

Some account is given of the pathology of the disease, and possible methods of transmission are discussed.

BUSHLAND, R. C. (1940). **The Toxicity of Some Organic Compounds to Young Screwworms.**—*J. econ. Ent.* **33.** 669–676.

A total of 551 organic compounds was tested for toxicity *in vitro* against the larvae of *Cochliomyia americana*. Of the materials tested, 11 were found to be more toxic than phenothiazine, *viz*, cinchonine, *m*-dinitrobenzene, 2, 6-dinitro-4-chlorophenol, 3, 5-dinitro-*o*-cresol, 2, 6-dinitro-6-cyclohexylphenol, methylphenylnitrosoamine, *o*-nitroanisole, *p*-nitroanisole, *p*-nitrobenzonitrile, *p*-nitrophenetole, and *p*-nitrophenylacetonitrile.

Rotenone was found to be much less toxic than phenothiazine.—W. MOORE.

BRITTON, J. W. (1941). **The Materia Medica of Phenothiazine.**—*Cornell Vet.* **31.** 1–12.

This is a summary of the published data of

many workers. It covers the chemistry, pharmacology, methods of administration, action on parasites, and toxicology of phenothiazine. Among the points mentioned under the various headings are :—

*Chemistry.*—It is the parent substance of many dyes of which the most important are thionol, Lauth's violet, and methylene blue. On exposure to air it undergoes spontaneous oxidation.

*Pharmacology.*—The site of absorption is unknown. Maximum concentration of derivatives in the blood is found six hours after treatment. It is excreted in the faeces unchanged and in the urine as potassium leuco-phenothiazine which becomes oxidized to thionol; oxidation occurs most rapidly in acid urine and is usually not completed until after excretion and exposure to air. It is also excreted in milk which turns pink on exposure; such milk will keep for days in a warm room.

*Methods of administration.*—Most animals will eat it in the food after a time, and it may be given in capsule form or as a draught in suspension with acacia.

*Anthelmintic efficiency.*—Results are most consistent in the horse in doses of 30–60 g. It can be given to pregnant mares up to the tenth month of gestation and may be of greatest use in such animals as a means of controlling parasitism in foals. Doses of 0·3–1 g. per lb. body weight give good results in sheep, and it is effective in swine at doses of 0·1–0·5 g. per lb. body weight. The drug has been used successfully in calves in doses of 50–80 g. and also in doses of 25–45 g. In poultry it is moderately effective in doses of 0·5–1 g. per lb. body weight; efficiency is increased by repeating the dosage daily for 2–3 days. It is ineffective in dogs.

*Other uses.*—It has been used in human medicine as a urinary antiseptic. Treatment of one cow affected with trichomoniasis was followed by a clearing-up of the condition; a total of 234 g. was given over an 11-day period.

*Toxicology.*—There is a wide margin of safety. Anaemia and photosensitization have been reported in man and abdominal pain and loss of appetite in the horse. It has caused dullness and loss of appetite in cattle and weakness of the hind legs and loss of consciousness in pigs.—W. J. Ironside.

Parish, H. E. (1940). **Effects of Phenothiazine on Chicken Lice.**—*J. econ. Ent.* **33.** 700.

Dusting chickens with phenothiazine provided extended protection from lice. White chickens were temporarily discoloured by the use of this chemical. Hens fed for 30 days on laying mash containing 5% phenothiazine suffered no apparent ill-effects.—W. Moore.

Tanabe, T. (1940). Vergleichende Untersuchungen über die pharmakologischen Eigenschaften einiger Anthelminthika und der zur Terpenreihe gehörigen Substanzen; sowie Wurmabtreibungsversuche mittels Menthols an Hunden. **[Pharmacological Properties of Anthelmintic Drugs].**—*Jap. J. med. Sci.* **12.** Pt. IV. 40–42. [In German]. [Abst. in *Brit. Chem. Physiol. Abstr.* Jan. 1941. p. 38, copied *verbatim*. Signed : H.H.K.]

Menthol, menthone, menthyl acetate, pinene, camphor, borneol, thymol, naphthalene, $\beta$-naphthol, $CCl_4$, santonin, and macnin (an extract of *Digenea simplex*) inhibit isolated rabbit's intestine. Menthol, camphor, nematol, santonin, and naphthalene have a stimulating action on earthworms followed by paralysis. The drugs first increase and later decrease the tone of denervated muscle preps. of earthworms. Their toxic action on ascarids of pig and horse was determined. Menthol and menthone have a good anthelmintic action in dog experiments especially if they are given together with a substance which prevents their absorption.

Mönnig, H. O., & Ortlepp, R. J. (1939). **A Tetrachlorethylene Emulsion as an Anthelmintic.**—*Onderstepoort J. vet. Sci.* **13.** 193–197.

A method of making a stable emulsion of tetrachlorethylene for treatment of worms in sheep is described. The emulsion consists of 75% tetrachlorethylene and 25% emulsifier in the making of which resin, casein, and alkali are used. The emulsion is effective against hookworms in sheep (*Gaigeria* and *Bunostomum*, but less so against the latter), and against *Haemonchus*, *Trichostrongylus* and *Nematodirus*. Against *Oesophagostomum columbianum* its efficacy was found to be low.—E. M. Robsinson.

Pou, M. C., Calzada, V., & Garcia, J. A. R. (1937). Primeros ensayos sobre el grado de eficacia de substancias vermífugas. **[Efficiency of Copper Sulphate as an Anthelmintic against Worm Parasites of Sheep].**—*An. Fac. Vet., Montevideo.* **3.** 63–65.

An account of a trial of copper sulphate for the expulsion of helminth parasites in four sheep. Doses of 100–400 c.c. of a 1% solution were given. Results were satisfactory in the two animals which received 100 c.c. of the solution. The 400 c.c. dose proved lethal. No new knowledge is contributed.—M. WATSON.

CULBERTSON, J. T. (1940). **The Elimination of the Tapeworm Hymenolepis Fraterna from Mice by the Administration of Atabrine.**—*J. Pharmacol.* **70.** 309–314.

In view of the action of atebrin recently demonstrated against *Giardia* infections in man and animals, it was decided to determine the effect of this drug on natural *Hymenolepis* infestations in mice. It was found that 10 mg. atebrin given *per os* for two successive days and slightly smaller doses for longer periods eliminated *H. fraterna* from mice. The prolonged dosage was better tolerated by the mice. Small doses of the drug caused the temporary suppression of egg-production by the worms without completely eliminating them from the animals.—M. L. BINGHAM.

GUTHRIE, J. E., & HARWOOD, P. D. (1941). **Use of Tin Preparations for the Treatment of Chickens Experimentally Infected with Tapeworms.**—*Amer. J. vet. Res.* **2.** 108–116.

The authors tested several organic and inorganic tin compounds for their value against *Raillietina cesticillus* and *Hymenolepis carioca* infestations. Fair results were obtained with tin oleate, stannous oxalate, stannous oxide hydrate, and stannous tartrate administered alone, but the addition of synthetic pelletierine hydrochloride to any of these substances materially increased their value. The best results were obtained with a mixture of 0·3–1·0 g. stannous tartrate and 0·07–0·2 g. synthetic pelletierine hydrochloride, which was administered with an average indicated efficacy of 86·8% to 58 birds each artificially infested with 50 cysticercoids of *R. cesticillus*.

The same mixture was over 95% effective against *H. carioca* when tested on 9 chickens which had been experimentally infested with 1,000 cysticercoids each. The drug was well tolerated at the doses given.

WESCHE, H. (1938). Toxikologische und therapeutische Versuche mit Tetrachlorkohlenstoff am Geflügel. **[Toxicological and Therapeutic Trials of Carbon Tetrachloride in Poultry].**—*Inaug. Diss., Leipzig.* pp. 47.

Hens are very resistant to carbon tetrachloride given orally. Doses of 0·5–19·0 c.c. cause no harmful effects. With very large doses toxic effects are observed, *e.g.* loss of appetite, thirst, and anaemia. In pigeons small doses of the drug cause vomiting; larger doses proproduce disturbances of equilibrium and muscular tremors. Administration of carbon tetrachloride was not of any appreciable therapeutic value in infestations with *Heterakis* and *Ascaridia* in hens, or with *Capillaria* and coccidia in hens and pigeons.—J. M. ROBSON.

BAKER, D. W. (1941). **Yeast as an Adjunct to the Anthelmintic Treatment of Advanced Cases of Trichostrongylosis in Calves.**—*Cornell Vet.* **31.** 13–16.

Daily doses of ½ lb. of yeast were given to the two poorest animals, showing complete inappetence, of a group of 13 parasitized young cattle, and proved effective in promoting and maintaining appetite. At first the dose was given as a draught, then it was soaked and was eaten readily; later a gradually increasing quantity of food was mixed with it.

The yeast was discontinued on the ninth day, and in two days appetite was again in abeyance, but returned when yeast dosing was resumed. This procedure was repeated at the 28th day. Administration was finally stopped on the 50th day, when the animals were much improved. Anthelmintic treatment was applied on the 16th and 25th days.—W. J. IRONSIDE.

HOWELL, C. E., & STEWART, M. A. (1940). **Preliminary Studies on the Effects of Diet upon Internal Parasites in Horses.**—*Amer. J. vet. Res.* **1.** 58–62.

According to the authors, there have recently been many unofficial statements to the effect that prunes act as an anthelmintic in horses. Employing small groups of Percherons, an attempt was made to evaluate the effect of a diet consisting largely of prunes, and also that of a vitamin A deficient diet, upon infestation with strongyles and with *Parascaris equorum*. The animals were already infested when selected for the experiment or had subsequent opportunities for natural infestation, and the results were judged on the basis of egg counts of faecal samples. It appeared that horses maintained on a vitamin A deficient diet were more susceptible to *P. equorum* infestation than were controls fed a normal diet, but the design of this experiment did not permit of statistical interpretation. The prune-fed animals appeared to be significantly more susceptible to

strongyle infestation than either the controls or the vitamin A deficient group. The degree of infestation was in this case very low throughout. No data were obtained on the effect of a prune diet on *P. equorum* infestation.—A. N. W.

PASCHOUD, H. (1940). Irradiation ultra-violette primaire, des plaies souillées. **[Ultra-Violet Irradiation of Contaminated Wounds].**—*Pr. méd.* **48.** 387–389.

Four case histories are given as examples of the great benefits which, according to P., result from the use of ultra-violet irradiation of contaminated wounds. A history and description of the apparatus are given, together with a theory of the biological action of ultra-violet irradiation and an account of the surgical measures which should accompany such treatment. P. states that he proposes to use the method in the treatment of all war wounds, as its value in the treatment of "clean" wounds is said to be established.—A. N. WORDEN.

PULVERTAFT, R. J. V., & WALKER, J. W. (1939). **The Control of Air-Borne Bacteria and Fungus Spores by Means of Aerosols.**—*J. Hyg., Camb.* **39.** 696–704.

The optimum chemical, physical, and mechanical conditions for the production of a bactericidal aerosol are discussed [see also *V. B.* **10.** 620]. Using *Chromobacterium prodigiosum* and *Streptococcus haemolyticus* as test organisms it was found that addition of 20% glycerin to hypochlorite solution enormously increased the efficiency of this substance as an aerosol, and although it is less efficient than a resorcinol preparation it has the advantage of being cheap and has a marked deodorizing effect on the atmosphere of rooms into which it is introduced. A new substance with a base of resorcinol is described which is suitable for both atmospheric and surface sterilization. Experiments were carried out which indicate that aerosols may also be effective in destroying air-borne fungus spores.—R. ALLCROFT.

I. TWORT, C. C., BAKER, A. H., FINN, S. R., & POWELL, E. O. (1940). **The Disinfection of Closed Atmospheres with Germicidal Aerosols.**—*J. Hyg., Camb.* **40.** 253–344.

II. BAKER, A. H., FINN, S. R., & TWORT, C. C. (1940). **The Use of Hypochlorites for Aerial Disinfection.**—*Ibid.* 560–582.

III. MASTERMAN, A. T. (1941). **Air Purification by Hypochlorous Acid Gas.**—*Ibid.* **41.** 44–64.

I. Extensive and comprehensive data are presented on the prevention of air-borne infection by means of germicidal mists or aerosols. The problem was investigated from mechanical, physical, chemical, bacteriological, and biological aspects. Mists of various phenolic germicides in several solvents were studied by means of the ultramicroscope in order to establish relations between their physical behaviour and their bactericidal potency. It is shown that the efficiency of aerial germicides is partly a function of their volatility, but their solubility may be of equal importance. The technique used for testing the effectiveness of various germicides consisted of atomizing an equal volume of bacterial emulsion into two identical chambers, and the germicide under test into one of them. Colony counts on agar plates exposed in both chambers at definite intervals were compared and the percentage of organisms surviving the action of the germicide recorded. Examples are given of suitable germicides and solvents, and of their lethal effectiveness in air. The most effective all-round germicidal mixture was found to be 10% hexyl-resorcinol dissolved in propylene glycol + 0·05% sulphonated lorol (designated $S^2$); other substances were found equal in germicidal activity but were unsuitable for use in the presence of human beings. The relationship between germicidal efficiency in the air, and mist particle size and persistence was studied by means of centrifugal mists; particles of 0·5–1·0 $\mu$ radius were found to be the most useful in dealing with bacterial particles containing organic matter. Tests on the penetrating properties of bactericidal mists and bacteria through certain cloths were carried out, the surface sterilizing properties of aerosols was investigated, and differences in effect on horizontal and vertical surfaces noted. The degree of tolerance of human beings and mice for a number of germicides was compared with the degree of tolerance of bacteria for the same substances; the tests on man were confined to the detection of the substances in the air by the special senses. It is concluded that aerial disinfection by means of germicidal mists may prove to be a valuable prophylactic measure for air-borne infection and infections contracted by other means such as contact with contaminated objects, and it should, therefore, be equally effective in veterinary practice.

II. A proprietary preparation of sodium hypochlorite was tested for germicidal action

on bacteria suspended in air by methods similar to those described in I, and found to be most effective when diluted about five times. The claim that NaOCl sprayed into the air is bactericidal by virtue of the hypochlorous acid gas liberated is not verified, but it is shown that HOCl has some lethal action and is more effective in solution as a mist. Objections to the use of hypochlorite mists are discussed [see III] and it is thought that they constitute a real drawback to the use of continuous hypochlorite mists for controlling human air-borne disease. Preliminary investigations were carried out on the use of ultra-violet light and continuous filtration of circulating air as methods for combating aerial infections.

III. A synopsis of the work up to 1939 on the use of hypochlorites for air purification is given and a report of the paper by BAKER, FINN & TWORT [see II] is discussed in detail. The data obtained by these authors confirm the view that HOCl gas is the active germicide in hypochlorite spraying. Sterility can be approximately attained by HOCl gas with a volumetric concentration in air of not more than $(3{\cdot}5 \times 10^9)^{-1}$. [See also *V. B.* **11.** 322.] The application of the aerosol theory is discussed [see *V.B.* **10.** 620.], and reasons are given for its non-applicability to hypochlorite spraying. The alleged drawbacks to the use of hypochlorite air disinfection, *viz*, odour, irritant effects, opacity of the mist, and corrosion of metals, are discussed and shown to be of no practical importance.—R. ALLCROFT.

ROBERTSON, O. H., BIGG, E., MILLER, B. F., & BAKER, Z. (1941). **Sterilization of Air by Certain Glycols Employed as Aerosols.** —*Science.* **93.** 213–214.

Evidence is given showing that propylene glycol and related glycols act as effective bactericidal aerosols [see also *V. B.* **10.** 620]. *Staphylococcus albus* was used as the test micro-organism in experiments on the general principles of the method. It was found that one part by weight of propylene glycol in two million volumes of air, effected complete sterilization of an atmosphere containing 200,000 bacteria per cubic litre of air; air samples taken a few seconds after the introduction of the aerosol yielded sterile plates. Other micro-organisms found to be similarly susceptible to the action of this aerosol were pneumococci types I and III, haemolytic streptococci and staphylococci, and *Streptococcus viridans*, *Bacterium coli*, and *Micrococcus catarrhalis*. Ethylene glycol and trimethylene glycol were as effective as propylene glycol, but glycerin exhibited only slight killing action. Tests were carried out to demonstrate the true germicidal action of the aerosols.—R. A.

## POISONS AND POISONING

ROBB, W., & CAMPBELL, D. (1940). **Some Notes on Lead Poisoning in a Group of Ayrshire Heifers.**—*Vet. Rec.* **52.** 39–41.

The authors describe the symptoms of lead poisoning in eight Ayrshire heifers. Five animals died from acute poisoning and three subacute cases recovered. Most of the symptoms were those usually observed; the classical symptom of chronic poisoning, *viz*, the blue line in the gums, was not observed in the three subacute cases which recovered. Lead was recovered chiefly from the omasum. The source of the lead was traced to grass contaminated with paint at the bottom of a green-painted fence, and there were several paint-contaminated articles.—R. FISHER.

SALM, R. (1940). **The Histological Effects of Intraneural Injections of Quinine Compounds.**—*J. Pharmacol.* **70.** 245–253.

Necrosis of the axis cylinders and of their myelin sheaths was produced when 1% solutions of quinine hydrochloride or of quinine and urea bihydrochloride were injected into the sciatic nerve of rabbits. Very little of the damaging effect could be attributed to pressure (saline controls) and regeneration occurred normally. It is therefore concluded that the analgesic properties of quinine are to be attributed to nerve damage rather than to true anaesthesia, and that for general purposes the use of quinine in local anaesthesia should be discontinued. Very few animals were employed, but it is stated in explanation that the results were clear cut.—ALASTAIR N. WORDEN.

HURST, E. W. (1940). **Experimental Demyelination of the Central Nervous System. 1. The Encephalopathy Produced by Potassium Cyanide.**—*Aust. J. exp. Biol. med. Sci.* **18.** 201–223.

Monkeys were poisoned with potassium cyanide in single and multiple doses. This frequently produced areas of partial or com-

plete demyelination, and of actual necrosis in the white matter, and necrosis in the grey matter. Occasionally single doses produced this result, but prior intoxication with the drug appeared to favour localization in the white matter. Clinical observations suggested a summation of the effects of individual doses of the poison.

In distribution the lesions bear considerable resemblance to those in Schilder's disease in man, and in histological detail they resemble those of acute epizootic leuco-encephalitis of horses.—W. I. B. Beveridge.

Couch, J. F., & Briese, R. R. (1939). **Hydrogen Ion Concentration and Cyanogenosis in Sorghum.**—*Amer. J. Pharm.* **111.** 55–64, 151–160 and 193–201.

It is well known that acidified or alkalized mixtures of cyanogenetic plants and water develop much less HCN than do mixtures that have not been so treated. Investigations were made to determine whether the phenomenon depends on the pH of the mixtures or whether the nature of the acid is a factor. The plants used were species of sorghum; the varieties *hegari* and *spur feterita* represented *Sorghum vulgare* and a dried specimen of Johnson grass represented *Sorghum halepense*. The effect of hydrochloric, sulphuric, and tartaric acids was investigated with all these types of sorghum and, in addition, acetic and oxalic acids with Johnson grass. It was found that cyanogenesis was stimulated by small concentrations of these acids and repressed by higher concentrations, the effect being roughly proportional to the dissociation constant of the acid. The character of the acid (organic or inorganic) had little effect, and the pH ranges in which there was optimum production of HCN did not vary significantly for the different acids. The optimum ranges for *hegari* and *spur feterita* were 4·10–4·86 and for Johnson grass 5·04–5·16. The buffering action which sorghum exhibits against these acids was more pronounced with fresh than with dried plants. —R. Allcroft.

Curasson, G. (1938). État actuel de nos connaissances sur les plantes toxiques de l'A.O.F. [**Plants Poisonous to Animals in French West Africa**].—*Bull. Com. A.O.F.* **21.** 149–173.

A survey is given of plants reputed or known to be toxic for human beings and animals in French West Africa. These plants are arranged in their families in alphabetical order, and to assist identification the names by which they are known in various native dialects are given. Detailed information, however, of the toxic principles involved and of their effects upon animals appears to be lacking, and in these areas there seems to be a vast unexplored field of toxicology and chemical elucidation.—A. E.

Steyn, D. G. (1938). Die wichtigsten südafrikanischen Giftpflanzen. [**South African Poisonous Plants**].—*Z. InfektKr. Haustiere.* **53.** 333–349.

A general article dealing with the more important poisonous plants of South Africa, from the point of view of their veterinary significance, and well illustrated by reproductions from photographs of plants and clinical cases of animals affected by them. It is a useful précis for the German reader and as such would be more suitable for translation than for abstracting. The subject matter, however, has appeared in English in various publications already abstracted [see *V. B.* **4.** 61, 131 and 595; **5.** 455 and 660; **6.** 270; **8.** 179, and **10.** 711]. Readers who need a reference book on the topic should use S.'s larger text-book "The Toxicology of Plants in South Africa" [*V. B.* **4.** 595].—H. H. Green.

I. Robb, W., & Campbell, D. (1941). **Poisoning of Sheep by the Consumption of Laurel Leaves.**—*Vet. Rec.* **53.** 93–95.

II. Wilson, D. R., & Gordon, W. S. (1941). **Laurel Poisoning in Sheep.**—*Ibid.* 95–97.

I. An account of poisoning in a flock of sheep, grazing in a public park, as a result of eating the leaves of the common or cherry laurel (*Primus laurocerasus*). The characteristic clinical features of the disease were sudden onset, intermittent attacks of severe respiratory distress, twitching movements and staggering, and sometimes attempts at vomition; the attacks ended in death or speedy recovery. Between the attacks the sheep appeared to show a reluctance for food, but otherwise nothing remarkable was noted. One noteworthy feature was that symptoms developed in a few animals as long as five days after they had been removed from the pasture. At autopsy there were no macroscopic lesions. The symptoms appeared to indicate that poisoning was due to hydrocyanic acid, and a contributory factor to the liberation of HCN from the laurel leaves may have been rain, occurring on the day before the onset of symptoms,

II. Examination of the tissues and body fluids of the sheep dying in the outbreak of poisoning recorded in I, revealed no evidence of pathogenic bacteria or of mineral poisons. A series of experiments in which the laurel leaves were fed to sheep, although somewhat inconclusive, suggest that the cause of death in the experimental sheep may have been poisoning caused by HCN liberated from the laurel leaves during the process of digestion.

—N. J. SCORGIE.

MATHEWS, F. P. (1940). **Poisoning in Sheep and Goats by Sacahuiste (*Nolina texana*) Buds and Blooms.**—*Bull. Tex. agric. Exp. Sta.* No. 585. pp. 19.

The buds and blooms of *N. texana* are poisonous to sheep and goats and, to a lesser extent, to cattle. The leaves appear to be non-toxic for cattle and are not eaten by sheep or goats. M. gives a botanical description of the plant, an account of natural and experimental cases of the disease which results from its ingestion, a brief note on the as yet unsuccessful attempts to isolate the toxic principle, and some suggestions on control.

In both natural and experimental infection there is inappetence followed by an intense icterus, ocular and nasal discharges, and evidence of photosensitivity (reaction to light, the appearance of a purplish band on unpigmented hooves, and darkened urine : porphyrin determinations were not attempted). Recovery is exceptional. The daily administration of fresh buds and blooms to sheep at a level of approximately 1 % of the body weight produced toxic effects after 12 days, but at twice this level and upwards symptoms were noted after five days. These effects were produced when lucerne hay was fed in conjunction with the toxic material ; addition of fresh green grass to the ration rendered the affected animals sensitive to sunlight. The characteristic pathological features, apart from the icterus, were marked hepatic and renal injury. The similarity of the condition to that produced surgically by QUIN [*V.B.* **4.** 677. Pt. VI.] is noted. As the blooming season is very short, control may be effected by regulation of the stocking of the pastures concerned.—A. N. W.

CHUKH, P. F. (1939). Intoksikatsii u loshadeĭ kormami, porazhennymi plesen'yu. [**Poisoning of Horses with Mouldy Fodder**].—*Sovyet. Vet.* No. 1. pp. 66–69.

An account of illness on five farms of a total of 93 horses which had been fed mouldy fodder ; the mould concerned was stated to be a species of *Aspergillus*. 50–90 % of the horses died. Some comparisons are made between the syndrome in the affected horses discussed in this paper and in that of horses affected with botulism or poisoned with certain alkaloids. No important information is provided.

WHITE, E. G. (1940). **Aspiration of Plant Material by Young Calves and the Resulting Tissue Changes in the Lungs.** —*J. Path. Bact.* **51.** 458–460.

Lung lesions due to the aspiration of plant material are described in three of a series of 16 young calves which had received a single dose of bovine tubercle bacilli by various routes. Sections of the lungs showed aspirated plant material within a number of the bronchi as well as smaller particles within the lung alveoli. Some of the plant material was identified as linseed. The lungs showed numerous abscesses from which *Corynebacterium pyogenes* was isolated. The probable dietetic source of the plant material is discussed, but it was not possible to decide whether the pneumonic lesions preceded or followed the aspiration of the material.—N. J. SCORGIE.

STEYN, D. G. (1940). **Animals and Poison Gas Warfare.**—*J. S. Afr. vet. med. Ass.* **11.** 75–97.

This article is a review of the various poison gases available in modern warfare. Commencing with a description of the methods of producing smoke screens it goes on to discuss the different types of poison gas. These are divided into :– (1) true poisons, (2) asphyxiants, (3) lachrymators, (4) vesicants, (5) sternutators, and (6) labyrinthic poisons. In each case a description is given of the various gases available. The symptoms caused by, and the methods of combating the effects of, these gases are described. Finally, the question of the food value of animals poisoned by gases is discussed, and a section is devoted to anti-gas organization. This includes decontamination and the prevention of poisoning by gases. A very comprehensive list of over 90 references is given for the use of those who wish to pursue the subject further.—E. M. ROBINSON.

## PHYSIOLOGY

KESTNER, O. (1940). **Heat Regulation in Animals, with Special Reference to Tropical Conditions.**—*Vet. Rec.* **52.** 74–76.

This review of the physiological processes concerned with heat regulation has been written for the benefit of those engaged in increasing the production of domestic animals in the tropics. It is pointed out that the thermoregulatory mechanism functions differently in different homoeothermic species, but that in all cases an inefficient mechanism results in the consumption of extra energy, with consequent detrimental effect on, *e.g.*, milk yield, meat production, or even resistance to disease. The various physiological processes involved are dealt with under the following headings :–

*Metabolic influence.*—In large mammals, the metabolic thermoregulatory mechanism is employed in emergency only. Cold weather does not produce an increase of metabolic rate in well fed animals. Ruminants cannot diminish internal combustion even in tropical sunshine, and nearly all large tropical mammals look for shade and sleep during the hot hours of the day. European cattle imported into the tropics frequently lose energy from the increase in metabolic rate which results from inefficient heat regulation and resultant fever.

*Evaporation of water.*—The surface area of the lungs is estimated to be about 80 times that of the skin. Air leaving the lungs has a temperature of about 90°F. and is saturated with water vapour. Every litre of water thus evaporated represents a loss of 580 calories, and the bulk of the heat formed during and after heavy muscular work is eliminated in this manner. High air temperatures and increased humidity interfere seriously with muscular work, whereas efficiency is increased in dry atmospheres or at lower temperatures. As the rate of evaporation of water is greater at low barometric pressures, mountain air is physiologically drier than would be expected from the meteorological data.

Small amounts of water are lost by evaporation from the skin.

*Vaso-dilatation and constriction.*—This is of very much greater importance in man, the naked skin of whom is rich in capillaries. Cutaneous vaso-dilatation may be so marked in man in a tropical atmosphere that the digestive organs are partially deprived of blood and hypochlorhydria results. In laboratory experiments under tropical conditions it was demonstrated that curry (presumably by its local stimulant action) restored gastric digestion to normal, and that onions exerted a similar, but less well-marked, effect.

*Secretion of sweat.*—In some species the sweat glands are found only in small localized areas of skin, but in man, the horse, and the donkey they are spread over almost the whole surface. A skin rich in pigment protects the inner organs, and white men going to the tropics are well advised to begin bronzing their skins on the outward passage. In many tropical areas situated at sea level the air is so saturated with water vapour that evaporation of sweat does not take place. Sweat is rich in NaCl, and this as well as the water must be replaced by alimentary intake. Adequate salt must be provided for saddle horses working in the tropics. Certain horses fail to sweat when galloped under tropical conditions, and may die of heat stroke when put into training. It is possible that their salt metabolism is in some way affected. Such animals are termed " dry sweaters ".

In addition to the various processes described, special habits and adaptations can be regarded as subsidiary means of controlling body temperature, and should be studied by the animal breeder.

[An editorial in the same issue recommends DILL's " Life, Heat and Altitude " (1938. Cambridge, Mass: Harvard University Press) to veterinarians who are interested in this subject].—ALASTAIR N. WORDEN.

ENGEL, D. (1941). **The Influence of the Sympathetic Nervous System on Capillary Permeability.**—*J. Physiol.* **99.** 161–181.

E. states that the degree of capillary permeability cannot be assessed without the rate of blood flow being taken into consideration ; this in its turn will be affected by temperature. A method was employed in which these points could be studied and the necessary technical details are given ; cats, dogs and rabbits were used. The dye penetration from the blood through the synovial membrane was tested by perfusing two stifle joints, the right one of which was deprived of its sympathetic nerve supply by unilateral lumbo-sacral sympathectomy. The dye substance was injected intravenously or intramuscularly and the perfusate

collected from the stifle joints. The left limb was used as a normal control. Local blood flow and temperature were recorded by thermoelectric means. It was found that in the majority of cases dye excretion was reduced on the sympathectomized side, in spite of vasodilation. This apparent antagonism is explained by the suggestion that there is a permeability factor controlled by the sympathetic nervous system.—C. W. OTTAWAY.

KAHN, A. J. (1940). **Studies on Intercostal Nerve Physiology.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 514–517.

In order to determine the physiological mechanism whereby referred pain of the abdomen is associated with pleurisy, intercostal nerves were isolated by rib resection and their fibres stimulated by means of a tetanizing current. It was found that stimulation of the intercostals of the diaphragm caused reflex contraction of the abdominal musculature through reflex connexions with lower intercostals. The role of these nerves in respiration is also discussed. Among other things it is suggested that they play an important part in the time lapse between respiratory movements.—C. W. OTTAWAY.

SCHMIDT, E. C. H., Jr., & RICHTER, C. P. (1941). **Anatomic and Behaviour Changes Produced by Partial Hepatectomy in the Rat.**—*Arch. Path.* **31.** 483–488. [Authors' summary copied *verbatim*].

Removal of approximately 66 per cent of the liver in each of 10 rats had a stimulatory effect on spontaneous activity in 6 animals. The other 4 animals continued at the preoperative level of activity.

The partial hepatectomy had little effect on food or water intake.

It brought out a tendency to constant cornification of the cells of the vaginal epithelium as shown in vaginal smears, or a lengthening of the cycle to six days.

The partial removal of the liver had no consistent effect on the endocrine glands.

FOLLEY, S. J. (1940). **Lactation.**—*Biol. Rev.* **15.** 421–458.

The present state of knowledge concerning the physiology of lactation is reviewed from three aspects, *viz*, endocrine, nervous, and biochemical; by the term lactation is meant the sum total of the complex of phenomena which comprise milk formation and its ejection from the gland. The development of the mammary gland is also included as the mammary apparatus undergoes striking changes during various stages in the life of the mammal.

Oestrogens mainly stimulate mammary duct growth in most species, but in the g. pig and goat they promote complete alveolar development. In the mouse only has progesterone been found to promote growth of the mammary ducts; in other species both oestrogens and progesterone are necessary for complete mammary development. Desoxycorticosterone, secreted by the adrenal cortex, will cause growth of the ducts in some species, while progesterone possesses activity similar to this adrenal cortex hormone. Androgens produce mammary development in some species. There is some evidence that the anterior pituitary produces a hormone which promotes mammary growth, but wider confirmation is needed. The anterior pituitary plays a major role in milk secretion and is essential for the initiation and maintenance of lactation; it is believed that a specific hormone (prolactin) is responsible for this activity, but evidence is available that other factors also are concerned. The presence of the adrenal and thyroid bodies is also essential for lactation.

Both oestrogen and thyroxine treatment increases the fatty and non-fatty solids in the milk. Prolactin increases the fat or lactose content according to the preparation used.

Stimulation of the teat causes reflex erection of the udder tissues and so initiates the process known as "letting down the milk"; this stimulation also causes liberation of prolactin from the pituitary.

Blood glucose and probably lactic acid are the precursors of milk lactose, but this may be formed during deamination of amino-acids in the mammary tissues. The fatty acids of the neutral fat of the blood are probably split to short-chain fatty acids to form milk fat, while caseinogen is synthesized probably from plasma protein and the inorganic phosphorus of the blood.—A. T. PHILLIPSON.

FREUD, J., LEVIE, L. H., & KROON, D. B. (1939). **Observations on Growth (Chondrotrophic) Hormone and Localization of its Point of Attack.**—*J. Endocrinol.* **1.** 56–64.

Complete hypophysectomy was carried out on 70 rats all 45 days old and each weighing 80 g., and a similar dummy operation was performed on 30 controls of the same age and weight as the experimental animals. Immediately after

hypophysectomy the tail and vertebral growth ceased entirely and the development of the vertebral epiphyses was disturbed. The difference between operated and unoperated animals was readily detected in skiagrams [X-ray photographs]. Skiagrams of the tail showed a disappearance of the space between epiphyses and diaphyses; epiphyseal closure, once completed, could not be reversed by treatment with growth hormone. Normal longitudinal growth in the tail was maintained and epiphyseal closure prevented in rats which received intraperitoneal injections of growth hormone prepared from acetone-dried or fresh beef pituitaries. It is suggested that the original technique of assay of growth hormone on a weight basis may be replaced by this new technique, whereby, in a seven-day experiment commencing on the day of operation, the tail growth is compared with that following the use of standard preparations under the same conditions.

A histological analysis was made of a large amount of skeletal material collected from the experimental animals and compared with that from normal growing rats. It was found that hypophysectomy gravely impairs the development of cartilage but does not affect the process of bone development; the growth defect after hypophysectomy is thus definitely localized in the growing epiphyseal cartilage. As growth hormone has a biologically typical point of attack at the proliferating cartilage it is suggested that the terms "growth hormone" and "chondrotrophic hormone" are synonymous.
—R. ALLCROFT.

BELASCO, I. J., & MURLIN, J. R. (1940). **The Effect of Vitamins A and C on Experimental Hyperthyroidism.**—*J. Nutrit.* **20.** 577–588.

Data on the basal metabolism and on liver, kidney, and thyroid tissue respiration of rats were determined in order to ascertain whether vitamins A and C affect thyrotoxic tissue respiration as they do thyrotoxic metabolism. The effect of the vitamins alone was also studied. Vitamin A and ascorbic acid did reduce to some extent the hypermetabolism associated with hyperthyroidism induced by injection of thyroxin. Neither vitamin produced any alteration of the basal heat production in normal rats. Both vitamins increased the respiratory rates of liver and of kidney cortical tissue, and ascorbic acid increased thyroid tissue respiration, while vitamin A depressed it, but neither vitamin altered the increased liver and kidney tissue metabolism associated with hyperthyroidism. The significance of these results is discussed.—R. A.

MENKIN, V. (1940). **Effect of Adrenal Cortex Extract on Capillary Permeability.**—*Amer. J. Physiol.* **129.** 691–697.

As M. has previously shown, capillary permeability is increased by inflammatory exudate or by the nitrogenous substance, "leukotaxine", which has been isolated in crystalline form from exudates [see *V. B.* **11.** 45 and 276]. It is now reported that intracutaneous injections of adrenal cortex extract will inhibit this increase of capillary permeability in the dermis of normal rabbits. The effect was obtained when a mixture of hormone and exudative material or leukotaxine was injected, or when separate injections were made into the same site at intervals of up to four hours.—A. N. W.

DAY, F. T., & ROWLANDS, I. W. (1940). **The Time and Rate of Appearance of Gonadotrophin in the Serum of Pregnant Mares.**—*J. Endocrinol.* **2.** 255–261.

One New Forest, one Shetland and six Welsh pony mares were artificially inseminated at various times during oestrus with sperm collected from a stallion of unknown breed. Ovulation, which occurred on the average about 48 hours after insemination, and pregnancy were both detected by rectal palpation. Serum was obtained from jugular blood samples and was assayed for gonadotrophin by its ability or otherwise to increase the weight of the ovaries of immature rats. Gonadotrophin appeared 30–47 days after ovulation, attained a maximal concentration of 43,000–352,000 I.U. per litre between the 60th and 75th days, and had almost completely disappeared after 110 days. These results are in close agreement with those of COLE [*V. B.* **9.** 121.], who found, however, that the rate of disappearance of the hormone was more rapid.

The withdrawal of blood, which in one case amounted to 10% of the total volume weekly over a period of four weeks, had no effect on the course of pregnancy and as far as could be judged did not influence the curve of concentration of gonadotrophin in the serum.—A. N. W.

WHITNEY, L. F. (1940). **The Time of Ovulation in the Bitch.**—*Vet. Med.* **35.** 182–187.

An extensive clinical study was made, extending over at least 14 years, of reproductive behaviour in the bitch. Animals of many

different breeds were employed, but environmental and nutritional conditions remained as little changed as possible. The paper records data obtained during the years 1931–38, and is based on 90 selected oestral periods.

A careful technique was employed in order to determine the days upon which a bitch would accept the male. The acceptance period varied in individual cases from 6–16 days [with a mean of 11 days]. Actual coitus was permitted on certain days only, and from the fertility or otherwise of such matings it is concluded that the optimum time for mating is after the third day of acceptance, or even later in individual cases.

W.'s statements regarding the time of ovulation are based mainly on his assumption that the duration of pregnancy in the bitch approximates very closely to 61 days in most cases, and not upon anatomical evidence. He believes that ovulation usually occurs at or about the fifth day of acceptance, but varies in different bitches, that ova may be fertilized several days after ovulation, and that coitus does not accelerate the shedding of ova.

—ALASTAIR N. WORDEN.

REHM, O. (1940). Die Cerebrospinalflüssigkeit der Tiere. **[The Cerebrospinal Fluid of Animals].**—*Arch. wiss. prakt. Tierheilk.* **76.** 39–46.

This paper is an introduction to what is presumably intended to be a series of later publications providing original data. It describes technique for obtaining C.S.F. of various animals, and abstracts the limited scattered data in the literature with respect to animals as distinct from man. It should, therefore, be consulted in the original.

—H. H. GREEN.

BLACK, D. A. K. (1940). **Blood-Urea and Plasma Chloride in Experimental Haemorrhage.**—*Lancet.* **239.** 618–619.

Severe simple haemorrhage, involving the removal of 20–50% of the blood volume, was induced in six dogs. A slight increase in the blood urea (average rise, 16 mg. per 100 ml.) resulted. Large doses of cortin, desoxycorticosterone acetate, or adrenalin appeared to be without influence on the rise in blood urea resulting from bleeding. The artificial uraemia resulting from oral dosage with 5 g. urea was, however, prolonged in animals which had been bled. Only slight changes in the plasma chloride resulted from haemorrhage.

After severe haemorrhages, the animals were observed to eat less meat, but they drank large quantities of water.—ALASTAIR N. WORDEN.

LEICHSENRING, J. M., BIESTER, A., DEINARD, H. H., LONGLEY, A. S., FURNAS, S. M., SUTHERLAND, E., FOSS, E. S., SPERRY, F., ROE, V. R., & BURRILL, L. M. (1939). **The Blood Picture in Haemorrhagic Anaemia.**—*Tech. Bull. Minn. agric. Exp. Sta.* No. 139. pp. 120.

A comprehensive study of blood changes occurring in haemorrhagic anaemia, induced in dogs maintained on a synthetic diet, is presented. Comparison is drawn between the blood picture in this experimental anaemia and that noted in idiopathic hypochromic anaemia. Numerous physical and chemical measurements on the blood of normal dogs are presented. After bleeding, return to normal is rapid in the case of the plasma volume, Ca, inorganic P, serum albumin, and fibrinogen. Components which return to normal slowly or remain persistently below normal modify the blood picture and provide the measurements used in assessing any nutritional régime designed to restore lost blood. These measurements include red cell volume and diameter, total blood volume, cell volume, haemoglobin, serum globulin, and protein N of whole blood. Constituents for which no marked trends were observed were leucocytes, non-protein N, urea, creatinine, and amino-acid N. The anaemia induced by haemorrhages uncomplicated by nutritional deficiencies, pregnancy, lactation, or infections, is of the hypochromic microcytic type.—H. H. GREEN.

MARINOVIĆ, O. (1939). Razvoj koštane srži s naročitim obzirom na eritropoezu u ossa carpi goveda od najranijih embrionalnih stadija do ostarenja. **[Development of Bone Marrow in the Carpus of Cattle, with Reference to Blood Formation].**—*Inaug. Diss., Zagreb.* pp. 16. [Abst. from German summary].

Bones of the carpus were examined histologically in Simmenthal and Simmenthal-cross cattle over an age range of 2½ months of foetal life to 16 years. Ossification centres were found to be present in all the carpal bones by 8½ months of foetal life and at this time endochondral ossification was more advanced in the radial, ulnar, and fourth carpal bones than in the rest. The first signs of haemopoiesis are evident in the ulnar carpal bone at 7½ months, but not in the accessory carpal bone until two

months after birth. Haemopoiesis in the carpal bones ceases from about that time.

BLUNN, C. T., HOWELL, C. E., & CALDWELL, R. W. (1940). **The Calcium, Inorganic Phosphorus and Magnesium Content of the Blood of Young Horses.**—*J. Nutrit.* **20.** 1–6.

Ca, Mg, and inorganic P were estimated in the serum of 14 Percheron and five thoroughbred foals at intervals from birth to 28 months of age. The Ca and Mg were similar to those reported for adult animals, averaging about 2·7 mg. and 12·6 mg. respectively per 100 c.c. serum. The inorganic P content of the foal's serum was higher at birth than that of the mare, being 5·1 mg. % as compared with 3·3 mg. % for the mare. During the first two weeks after birth the inorganic P level rose rapidly and reached a maximum of 7·9 mg. % at 8–10 weeks of age. After this period the level gradually decreased to the normal for adult horses as the animals became older.—R. ALLCROFT.

TYLER, C. (1940). **Studies of Calcium and Phosphorus Metabolism in Relation to the Chemical Structure of Bone. 2. Experiments with Moulting Birds.**—*Biochem. J.* **34.** 1427–1430. [For part I, see *V. B.* **11.** 119].

Similar studies to those previously reported were made on two birds, one in lay just prior to moulting, and the other in moult. The results show that the reciprocal relationship and the changes in the Ca of the calcium phosphate of bone and the residual Ca of bone are substantially similar to those occurring in birds in full lay.—R. ALLCROFT.

WEATHERFORD, H. L. (1940). **Some Observations on the Tusks of an Indian Elephant —the Innervation of the Pulp.**—*Anat. Rec.* **76.** 81–93.

An examination was made of the tusks of a 31-year-old female Indian elephant. The tusks grow continuously, and W. wished to determine whether or not the innervation of the pulp resembled that of the incisor teeth of rodents. An illustrated description of the pulp and its innervation is given, and the similarity to that of rodent incisor teeth is established.

The elephant tusk is devoid of enamel, but sawing off the ends of the tusks (a frequent practice under conditions of domestication) appears to be a painless procedure. W. shows that, as the crown of the tusk closes in during growth, a central tract of secondary dentine is formed.—ALASTAIR N. WORDEN.

THEWLIS, J. (1940). **The Structure of Teeth as Shown by X-ray Examination.**—*Spec. Rep. Ser. med. Res. Coun., Lond.* No. 238. pp. 82.

This report deals with the application of X-ray methods to the examination of teeth. The information gained over a period of seven years concerns the constitution, structure, and degree of calcification of enamel and dentine. To enable the reader to appreciate fully the experimental details the first part of the report describes the physical principles and methods used. The object of the work was to investigate the structure of teeth from a general standpoint; variations in structure were noted but no special attempt has yet been made to relate them to specific characteristics of the teeth, normal or diseased. It appears that many properties of a tooth may be related to differences in constitution, in crystalline arrangement, and in degree of calcification, the existence of which is revealed by X-rays. This fundamental research may ultimately prove to be of significance in more than one of the many problems both of the dentist and the research worker.—R. A.

## TECHNIQUE AND APPARATUS

I. RYU, E. (1940). **On a Simplified Method of Staining Acid-Fast Bacteria. II.**—*Jap. J. vet. Sci.* **2.** 488–490. [In Japanese: abst. from English summary]. [For part I, see *V. B.* **10.** 472].

II. RYU, E. (1940). **A Simple Method of Spore Staining.**—*Ibid.* 589–592. [In Japanese: abst. from English summary].

I. After hot carbol-fuchsin staining the smear is counterstained with malachite green without decolorizing the former stain.

II. This is a carbol-fuchsin method, using heat.

SCARTOZZI, C. (1939). Sull'influenza della centrifugazione nell'isolamento del micobatterio del tubercolo. [**Effect of Centrifugation on the Isolation of Tubercle Bacilli**].—*G. Batt. Immun.* **22.** 85–96. [English, French and German summaries]. [Abst. from English summary].

Centrifugation for two hours proved effective

in isolating tubercle bacilli from organic material containing few bacilli.

MUELLER, J. H., & JOHNSON, E. R. (1941). **Acid Hydrolysates of Casein to Replace Peptone in the Preparation of Bacteriological Media.**—*J. Immunol.* **40.** 33–38.

Although peptone is almost universally employed for the preparation of culture media for pathogenic bacteria, its use is attended by certain disadvantages. Firstly, its presence may interfere seriously with the isolation in pure form of various products of bacterial growth; secondly, toxoids prepared from peptone media have been known to produce severe reactions, and thirdly, there is a wide variation between different samples of peptone on account of the commercial methods of production. The authors have devised methods for the production of acid hydrolysates of casein, which they consider to be more satisfactory than present peptone preparations. In the first, hydrochloric acid alone is employed, and in the second a combined hydrochloric-sulphuric digestion is carried out. The original should be consulted for practical details. In both cases, the final product is deficient in tryptophane and has a rather high content of iron. The last feature is stated to be a disadvantage in the preparation of diphtheria and tetanus toxins, and the iron should be removed before the hydrolysates are used for such purposes.—ALASTAIR N. WORDEN.

KATO, K. (1941). **A Simple and Accurate Microfragility Test for Measuring Erythrocyte Resistance. A Combination Microhemopipette Method.**—*J. Lab. clin. Med.* **26.** 703–713. [Extract from author's summary copied *verbatim*].

A new microfragility test, utilizing the same principle as that originally employed by HAMBURGER and used for clinical purposes by von Limbeck and by Ribierre, and later modified by numerous workers, particularly Giffin and Sanford, but greatly simplified and especially adapted for use in small infants and animals, is described.

As tested by this method, initial hemolysis of normal human erythrocytes is found to occur at an average of 0·420 to 0·435 per cent concentration of sodium chloride solution, while complete hemolysis is most frequently seen at 0·315 to 0·330 per cent concentration. The normal range or span of hemolysis is thus approximately 0·1 per cent concentration. The simplicity and accuracy of the test are the features especially adapted to routine hematologic examination.

A few illustrative examples of the results obtained by this method in various diseases characterized by abnormalities in erythrocyte fragility are reported.

The normal hemolysis ranges of erythrocytes in a few mammals and pigeons, as measured by the microfragility test, are also recorded in this preliminary report.

FREIVOGEL, H., & BREEDIS, C. (1940). **Photographing Fresh Autopsy Material in Color with Polarized Light.**—*J. biol. photogr. Ass.* **8.** 173–177.

One of the chief difficulties in the photography of specimens by artificial light is the elimination of shadows and reflections. The authors have, however, been successful in surmounting this problem by using polarized light.

The object to be photographed is laid on a sheet of opal or black glass (the latter is preferred as it does not require such careful cleaning when trans-illuminated) and illuminated diagonally by two No. 2 Photoflood bulbs arranged in reflectors at opposite ends of the "photographic platform". Each is separated from the object by a Pola screen placed in a frame so shaped that no stray light reaches the objective. A similar screen is also fitted to the lens of a Leica camera (Elmar f.3·5–50 mm. or Hector f.4·5–135 mm.) supported on an adjustable stand above the objective. Prior to making an exposure this screen is rotated until all the high lights disappear.

Kodachrome "A" or fine grain panchromatic film is preferred. Full details with good diagrams are given of this useful photographic procedure.—N. S. BARRON.

ROE, M. A., LILLIE, R. D., & WILCOX, A. (1940). **American Azures in the Preparation of Satisfactory Giemsa Stains for Malaria Parasites.**—*Publ. Hlth Rep., Wash.* **55.** 1272–1278.

The most satisfactory stain for malaria parasites in the thick film technique has been Grübler's Giemsa stain, but as this is now unobtainable the possible chemical constituents of this mixture were examined successively, in simple combination with eosin, to determine their staining action on plasmodia. Azure B. was found to give the clearest definition and to stain, in contrast, both the cytoplasm and the chromatin of the parasite. A combination of azure B. and methylene blue, varying from 1 : 1–1 : 4, with appropriate amounts of eosin,

was also found to be satisfactory. The proper synonym for German azure I is azure B.

—C. W. Ottaway.

Coulston, F. (1941). **The Use of Diaphane for Mounting Giemsa Type Preparations.**—*J. Lab. clin. Med.* **26.** 869–873. [Author's conclusions copied *verbatim*].

1. Diaphane is unconditionally recommended as a mounting medium for preparations stained with any Romanowsky-type stains in place of balsam or cedar oil.

2. An alcohol-acetone and a dioxane method suitable for dehydrating tissues stained with the Romanowsky-type stains are presented. Each method has been used successfully.

3. A simple method for staining tissues with Giemsa which has proved especially useful in bird malaria and fowl pox research is described.

—. (1940). **The Electrophoresis Apparatus with Improved Optical System. Based upon the apparatus of Prof. A. Tiselius, Upsala. Developed with the collaboration of Dr. A. S. McFarlane and Mr. R. A. Kekwick of the Lister Institute of Preventive Medicine, London.** pp. 12. London: Adam Hilger Ltd. [4to].

This brochure gives a concise illustrated description of the large and small forms of the Tiselius electrophoresis apparatus, including details of the construction and arrangement of ancillary equipment.

The details and method of operation of the improved optical system are described very fully and a typical electrophoresis diagram, obtained with the apparatus, forms one of the figures.

A brief review of the literature, indicating the scope of the method in biological research, is accompanied by a full bibliography up to early 1940.

Tiselius, A. (1940). **Electrophoresis Methods for the Isolation and Characterisation of Biologically Important Substances.**—*Rep. Proc. 3rd. Int. Congr. Microbiol. 1939.* pp. 54–62. New York: International Association of Microbiologists. [In English].

A general account is given of the methods available for the study of electrophoresis, with particular reference to modern developments. The scope and limitations of the methods are discussed.

The results recently obtained in the study of normal, immune, and pathological sera are described in some detail. In addition the characteristics of other biological fluids, respiratory pigments, bacterial proteins, and enzymes as revealed by electrophoresis are considered.

—R. A. Kekwick.

Ruska, H., von Borries, B., & Ruska, E. (1939). Die Bedeutung der Uebermikroskopie für die Virusforschung. **[The Importance of Ultramicroscopy in Virus Research].**—*Arch. ges. Virusforsch.* **1.** 155–169.

A detailed account is given of the construction, theory, and operation of the electron microscope. Magnifications up to 30,000 diameters can be obtained. It is possible to observe the image directly on a fluorescent screen or to make photographic recordings.

Electron microscope photographs of a number of bacterial and virus suspensions are reproduced and the type of data obtainable from such photographs is discussed.—R. A. K.

Eirich, F. A., & Rideal, F. K. (1940). **The Air-Driven Ultracentrifuge.**—*Nature, Lond.* **146.** 541–542 and 551–552.

Details are given of a simple, air-driven ultracentrifuge, embodying a new form of speed recording using a synchronous motor. The diagonal *Schlieren* optical system is used for observing and recording sedimentation. Sedimentation data obtained on egg albumen, cytochrome C, arachin, and carbonic anhydrase are described in some detail.—R. A. K.

Hayes, S. N. (1940). **Imperfect Sterilization of Dressings as a Probable Cause of Post-Operative Tetanus.**—*Brit. med. J.* Dec. 14th. 825–827.

Attention is drawn to the fact that cotton wool and other surgical dressings may contain tetanus spores, and that post-operative tetanus may possibly be caused through using dressings which have been imperfectly sterilized. From his observations, H. states that sterilizers are often of faulty construction in that there is no mechanism by which air can escape from the sterilizer and the dressings; this air falls to the bottom of the sterilizer and results in a lower temperature in this region than in the upper part of the sterilizer. For efficient sterilization H. recommends a sterilizer with an air-escape tap fitted at the bottom, by which air can escape whilst the steam pressure is being raised. Another cause of faulty sterilization is shown to be the packing of dressings too tightly in non-perforated drums into which the steam cannot penetrate. In a series of experiments

in which tetanus spores were inserted into the dressings it was shown that efficient sterilization could be accomplished only when the air was first evacuated from the bottom of the sterilizer and the steam pressure allowed to rise to 10–20 lb. for 20 min.—N. J. SCORGIE.

POHL, H. A. (1940). **Convenient Heat Filter for Tissue Illuminator.**—*Science.* **92.** 612.

In the quartz rod tissue illuminator [see *V. B.* **11.** 134.] a large amount of heat accompanies the passage of light through the tissues. It has now been found that the insertion of a double thickness of inexpensive " heat filter " glass at the break in the quartz rod light conductor, reduces the heat transmitted to the tissue to at least one-seventh of its previous value but does not reduce significantly the intensity of transmitted light. The heat transmitted is so small as to be safely absorbed by the tissue and the use of Ringer's solution as a cooling agent may be avoided.—R. ALLCROFT.

MCCAULEY, W. E., & RUSSELL, H. G. (1940). **External Parasites of Sheep in Illinois : A Portable Dipping Vat.**—*J. econ. Ent.* **33.** 547–550.

A description is given of a sheep-dipping bath, which is transportable on a motor car trailer and may be used without its being disconnected from the car. The dipper is capable of dipping 350 sheep per day, with a team of three operators.—W. MOORE.

## MISCELLANEOUS

BYWATER, H. E. (1940). **Air Raid Precautions for Animals.**—*Vet. J.* **96.** 221–231 and 269–280.

B. gave the aims of A.R.P. for animals and described the methods of attack, the injuries to be expected, their prevention and treatment, and also the measures to be taken in connexion with the salvaging of animal products.—R. F.

FLIGHT, C. H. (1940). **The Slaughtering of Ostriches.**—*J. S. Afr. vet. med. Ass.* **11.** 20–22.

In spite of the slump in ostrich feathers which occurred in 1914, thousands of ostriches are still kept in the Oudtshoorn district of the Cape Province. The skins, feathers, and biltong or dried meat find a ready sale. Ostriches are slaughtered in large numbers for their meat. The slaughtering is done by natives, and F. describes the way in which the slaughterer kills the birds by breaking their necks with his hands. Only the thigh muscles and some of the postero-lateral ones of the trunk are used for making biltong. The meat is preserved in salt, cloves, and spice and dried for about eight days ; 15–16 lb. are obtained from one bird.—E. M. ROBINSON.

—. (1939). Atti della 1ª Adunata Nazionale dei Veterinari per la fecondazione artificiale 11–12 Aprile 1939—XVII. Celebrazioni Spallanzaniane 11–14 Aprile 1939—XVII. R. Universitá di Pavia. **[First National Veterinary Conference on Artificial Insemination. Held During the Spallanzani Celebrations at Pavia University, April 1939]**. pp. 438. Milan: Istituto per la Fecondazione Artificiale. [4to] [In English, French, German and Italian].

At this conference numerous papers were read and discussed by members from many nations, pioneers in the new breeding technique in their own countries. Most papers are in Italian, but all were summarized in English, French, and German and printed as a supplement. Titles of individual papers may be found in *Index Veterinarius.* **8.** no. 1, and **9.** no. 1.

The report is a useful repository of current knowledge on artificial insemination.—J. E.

—. (1939). Legislación sobre policia sanitaria del ganado. **[Sanitary Police Legislation for Livestock (Colombia)].** —*Rev. Med. vet., Bogotá.* **9.** 176–202.

This is an account of existing legislation. Contagious and infectious diseases such as anthrax, tuberculosis, dourine, glanders, piroplasmosis, foot and mouth disease, and rabies are reported to the local authority which takes the necessary prophylactic and control measures. Animals affected with any infectious disease must not be exposed in any public place, market, etc. Meat inspection and port inspection of imported animals are carried out by veterinary surgeons or trained officials. Anthrax carcasses must not be opened or cut and they must be incinerated or buried deeply.

External parasites must be dealt with, and a number of dipping centres have been established by the Government. The importation of zebu and other Indian cattle is prohibited, to avoid

the introduction of disease. Branding irons must conform to the government standard, and all irons are examined and registered by the local authority.

All cases of bovine abortion are reported and examined for brucellosis by a veterinary inspector. Vaccines made from living brucella must not be used. Animals may not be moved from one district to another until they have been vaccinated against anthrax and a certificate must be shown proving that this has been done.
—MILLER WATSON.

FRICKERS, J. (1939). De geschiedenis van den diergeneeskundigen dienst in Suriname. **[The History of the Veterinary Service in Dutch Guiana]**.—*Tijdschr. Diergeneesk.* **66.** 616–628 and 667–676.

The first veterinary officer (S. de SANGE) to be appointed by the Government arrived in Dutch Guiana in 1898 and remained until 1901. He combined the work of the veterinary officer, inspector of the markets, and director of the abattoir at Paramaribo. The livestock industry was very small and no steps were taken for its improvement. Tuberculosis, actinomycosis, echinococcosis, and distomatosis were found to exist.

From 1902–1911 H. J. v. d. SCHROEFF acted as veterinary officer. The livestock then comprised 8,000 bovines, 3,000 pigs, 2,500 goats, 150 sheep, and 900 equines. Attempts at crossing bovines with zebus were unsuccessful. The abattoirs were improved and the meat was inspected by the local medical practitioner. 2,700 bovines and 2,300 pigs were slaughtered annually. Tuberculosis, anthrax, swine erysipelas, rinderpest, foot and mouth disease, sheep pox, cerebrospinal meningitis in horses, cysticercosis, and stephanurosis occurred, although not all every year.

From 1913–1922, E. VLEMING was in charge. The " Juliana Farm " station of zootechny was founded. In 1922 there were 13,418 bovines, 5,522 pigs, 3,287 goats, 302 sheep, and 1,133 equines. The principal diseases during the period were trypanosomiasis in horses, piroplasmosis, anaplasmosis, rinderpest, swine fever, trichinosis, and stephanurosis.

In 1927, F. CORSTEN became director of the veterinary services, but he died in 1929 before the accomplishment of his programme.

From 1930 onwards, F. has been in charge. Livestock has considerably increased, numbering in 1937, 21,209 bovines, 7,109 pigs, 4,912 goats, 729 sheep, 48 buffaloes, and 1,759 equines. About 4,000 bovines and over 2,000 pigs are slaughtered annually, and this is sufficient to supply local needs so that slaughter animals are no longer imported. The ophthalmic tuberculin test gave 52% positive results in one district.—L. TOBBACK.

—. (1939). **Poisons and Dangerous Drugs. Summary of Regulations for Veterinary Surgeons.**—*Vet. Rec.* **51.** 1466–1470.

This is a digest of those parts of the laws of Great Britain governing the sale and dispensing of poisonous drugs used in veterinary medicine, which are of practical importance to veterinary practitioners. It explains the necessary procedure for purchasing, storing, and prescribing the relevant drugs, which, however, are not listed in this digest.—J. E.

HELM, R., FORTNER, J., & HEMMERT-HALSWICK, A. (1939). Düngerpackungsversuche in festen Gärstätten. **[Research on Dung Disinfection by Fermentation in Permanent Containers]**.—*Z. InfektKr. Haustiere.* **54.** 214–237.

It is pointed out that the usual method of dung sterilization by heaping is unsuitable for material from abattoirs and similar places. Permanent fermenting chambers were designed which would allow the requisite intake of oxygen and conserve the heat generated to maintain a temperature of 55°C. A satisfactory container had brick walls to which cork plates were cemented. The depth was 1·2 metres, the dimensions in length and width being immaterial. About 10 cm. above the floor a grating was set, and openings in the side wall allowed access of air to the space under the grating. For use, the space under the grating was lightly packed with straw, and a layer of straw was laid over the grating to prevent the lower layers of dung getting cold. The container was filled to the height of 1 metre, and a layer of turf laid on the top to conserve the heat in the upper layers. The temperatures obtained depended to some extent on the type of dung to be sterilized, but they usually rose to 55°–60°C. within two days, rising on the fourth or fifth day to 70°–75°C. ; material such as ruminal contents, however, might require the addition of straw before it could be sufficiently aerated. Although anthrax spores were destroyed in some of the experiments, it is not considered that a sufficiently high temperature to destroy spores can be reached with certainty with all material ; non-sporulating pathogenic bacteria, however, are destroyed in five days, and fly larvae in 6–9 days, three weeks being required to kill non-sporulating organisms in the ordinary manure heap.—U. F. RICHARDSON.

## OFFICIAL AND OTHER REPORTS

GREAT BRITAIN. (1940). **Annual Report of the Hannah Dairy Research Institute for the Year Ending 31st March, 1940.** [WRIGHT, N. C.] pp. 20. Kirkhill, Ayr: The Hannah Dairy Research Institute. [8vo].

The report is divided into four sections, *viz*, (1) general, dealing with staff and developments, (2) research in progress, (3) finance, and (4) publications. Research on the following subjects has been carried out:– the protein requirements of dairy cows, the storage of feeding stuffs, lactation, bovine mastitis, bovine contagious abortion, and bacteriological control of milk. Investigations on the efficacy of chemotherapeutic agents for mastitis and to find a satisfactory diagnostic test were continued. The results of the work on bovine contagious abortion under the direction of the Agricultural Research Council are being collated.—J. C. WALLACE.

CANADA. (1935). **Progress Report of the Superintendent, Experimental Fox Ranch, Summerside, P.E.I., for the Years 1931, 1932, 1933 and 1934.** [SMITH, G. E.] pp. 57. Ottawa: Department of Agriculture. [8vo].

An account is given of the progress made on the main projects investigated at the Experimental Fox Ranch, and while recommendations are made, it is not considered that final conclusions have been reached; investigations are proceeding. The research work was divided into five main groups:– (1) nutritional requirements of foxes; (2) internal and external parasitic infestation; (3) inheritance of the inherent traits of foxes; (4) physiological processes, and (5) general ranching methods.

As maintenance of good physical condition is the important factor for fur production, for good breeding, and for gaining weight in the autumn, the deleterious effect of overfeeding is stressed. Experimental results indicate that the daily total caloric maintenance requirement for worm-free foxes is 95–100 calories per kg. live weight. The protein requirements of captive foxes are given for the various seasons of the year, being greatest during late autumn (October-December). Excessive amounts of protein should not be given during summer, nor to pregnant females as sterility may result both in the female and her progeny. The vitamin requirements of captive foxes were found to be related to the seasonal conditions and the foods normally available to the wild fox. Vitamins B and C appear to be the most essential especially during the spring, summer, and autumn. The requirement for A and D is very low except in pregnant and lactating females, and growing pups; cod liver oil is the best source for the former and milk for the latter. Substances rich in vitamin E have a favourable influence on the development of the fur and gain in weight when fed during the autumn.

The seasonal nutritional requirement of captive foxes was investigated from two aspects:– (1) the fitness of the environment to meet the requirements, and (2) seasonal changes and the nutritional requirements necessary to induce them. It was demonstrated that the best results were obtained when rations were fed which corresponded closely to the food available to wild foxes during the different seasons.

The results of breeding experiments indicated that the conception of hybrid vigour does not apply to silver foxes. The best results were obtained by intense breeding, *viz*, by such close matings as father and daughter, grandfather and granddaughter, son and mother, and brother and sister, etc. Large size, pale silver foxes should be chosen for breeding, the males with polygamous instinct, and the females from those having ancestors with a high litter rate.

The control of internal parasitic infestation was investigated and the use of dry wooden floors in the pens reduced the losses due to the common lungworm and the bladder worm. The majority of the foxes in the early stage of infection by either worm recovered. Hookworm infestation was also more easily controlled by simply keeping the foxes on wooden floors; in severe cases treatment with tetrachlorethylene was recommended and the dietary regime before and after dosing was discussed. External parasites were controlled by spraying the interior of the pens with paraffin oil. In treating individual foxes for fleas, derris root or pyrethrum powders were used, and for the ear mite a solution of iodine in glycerin.—J. A. GRIFFITHS.

BRITISH HONDURAS. (1939). **Report on Livestock, 1938.**—*Rep. Dep. Agric. Brit. Honduras, 1938.* p. 19.

The only item of veterinary interest is that

an outbreak of rabies in September, presumably introduced by dogs, spread to cattle, horses, and pigs and resulted in the death of several of these animals.—J. E.

I. EGYPT. (1939). **Annual Report of the Veterinary Service, 1934–1935.** [FARID, A.] pp. iv + 126. Bulâq, Cairo: Govt. Press. [8vo] [P.T.5].

II. EGYPT. (1939). **Annual Report of the Veterinary Pathological Laboratory during the Period from 1st of May 1934 until the end of April 1935.** [EL-KIRDANY BEY, A. M.]—*Rep. vet. Serv. Egypt, 1934–35.* pp. 9–33.

III. EGYPT. (1939). **Annual Report of the Serum Institute for the period from 1st May, 1934, to the end of April, 1935.** [GUINDI, M.] *Ibid.* pp. 34–58.

I. No cases of RINDERPEST occurred, except one case at Cairo quarantine among cattle imported from the Sudan. The usual warning about the danger of HAEMORRHAGIC SEPTICAEMIA during the Nile flood was issued. The number of cases (or outbreaks) of contagious diseases reported were as follows:– ANTHRAX 45, BOVINE CONTAGIOUS PLEURO-PNEUMONIA 4, HAEMORRHAGIC SEPTICAEMIA 115, GLANDERS 25, STRANGLES 60, TUBERCULOSIS 4,348, BACILLARY WHITE DIARRHOEA of chicks 371, FOWL CHOLERA 61, FOWL TYPHOID nil, FOWL DIPHTHERIA AND POX 293, FOWL PLAGUE 793, SHEEP POX 401, TRYPANOSOMIASIS 18, PIROPLASMOSIS 848, SPIROCHAETOSIS 172, RABIES 121, SWINE FEVER 19, FOOT AND MOUTH DISEASE 51, and STIFF SICKNESS 60.

II. The duties performed were as follows:– (a) routine examination of specimens; (b) examination of stock, P.M. examination, and collection of specimens whenever necessary; (c) preparation of biological products, their storage and issue, and (d) research work. Tables are included which give details of the results of the examination of specimens received. The following products are prepared:– haemorrhagic septicaemia antiserum (bovine and equine) and vaccine (bovine), fowl cholera serum, fowl diphtheria vaccine, streptococcus serum, mallein, and tuberculin. Subjects for research were:– TUBERCULOSIS, PASTEURELLOSIS, and a new method for staining the tubercle bacillus.

III. The institute prepares RINDERPEST virulent blood and serum, tests the potency of this serum, produces and tests the potency of a rinderpest vaccine derived from the spleen, tests purchased equines with mallein, distributes stores to the veterinary service and, in conjunction with the Veterinary Pathological Laboratory, prepares the antisera mentioned above.—J. C. WALLACE.

FRANCE. (1939). Rapport sur les travaux du laboratoire militaire de recherches vétérinaires pendant l'année 1938. **[Report of the Work of the French Military Veterinary Research Laboratory, during 1938].** [DESCAZEAUX].—*Rev. vét. milit.* **23.** 69–77.

The year's work is reviewed under various headings. Iron pigment was present in 63 out of 65 livers from horses affected with INFECTIOUS ANAEMIA: the livers from which it was absent were from chronic cases in which there were no clinical symptoms at the time of death. There is a correlation between the absence of the normal pigment from the spleen and its abnormal appearance in the liver. In infectious anaemia, its presence in the liver is associated with a lymphocytic infiltration. The examination of 94 sera by FULTON'S method confirmed the opinion expressed in previous reports regarding the interpretation of the reaction. Preserving *Streptococcus equi* in Martin broth-serum in sealed ampoules insured its virulence for at least six weeks, while the same streptococci when desiccated lost their virulence in a month. 13,700 c.c. of STRANGLES vaccine and 22,260 c.c. of antiserum were issued. In three cases of fistulous withers examined, one proved to be due to BRUCELLA INFECTION. The serum of two out of eight horses which had given a doubtful reaction to mallein, reacted positively to the complement-fixation test, but that was attributed to the fact that the serum had been taken 15 and 30 days respectively after a subcutaneous inoculation of mallein. The sera of 33 horses suspected of infectious anaemia were examined by the complement-fixation test for TUBERCULOSIS; one gave a positive reaction, but the horse failed to react to the intradermal injection of tuberculin. A severe case of TB. of the horse due to the bovine type of organism was identified. A classified list of the morbid material examined is given. An outbreak of SALMONELLA INFECTION in pigeons was diagnosed, and a method of estimating the potency of mallein is described.

—G. WILLIAMSON.

FRANCE. (1939). Statistiques vétérinaires de l'armée pour l'Intérieur, l'Algérie, la

Tunisie, le Maroc et le Levant. Année 1937. **[Veterinary Statistics of the French Army for France, Algeria, Tunisia, Morocco and the Levant for 1937]**.—*Rev. vét. milit.* **23.** 5–67.

The report deals with the effectives, the sick, the death-rate and castings.

There were 114,703 animals in the regular army in December 1937, an increase of nearly 4,000 on the preceding year. An analysis is made of the number of effectives according to location and age. The sick are grouped into seven general categories; each is analysed. The death-rate in various districts is compared with reference to the cause of death and the age of the animals. Castings are treated in the same way. The incidence of disease is tabulated so that it may be compared with that of the previous year in each of the five countries.

No cases of GLANDERS occurred during the year. In France there were 5,825 cases of STRANGLES, the death-rate from which was distinctly lower than that in 1936. Of 36 cases of TETANUS, 52·7% died as against 60·8% in the previous year. There were 47 cases of EPIZOOTIC LYMPHANGITIS, three of which were fatal. The number of cases of INFECTIOUS ANAEMIA was the same as in 1936, *i.e.* 114, but the death-rate was higher—76 as against 56. The number of admissions for debility and exhaustion is always high; for the year it was 1,129, of which 81 died. The entries for different digestive diseases are tabulated and the death-rate of each is given. Of the other diseases, no fewer than 2,490 cases of diseases of the respiratory system occurred, of which 149 were fatal. The highest mortality resulted from fractures, which accounted for 604 deaths.

—G. WILLIAMSON.

LEVANT. (1939). Rapport sur le fonctionnement du laboratoire de recherches du service vétérinaire des troupes du Levant pendant l'année 1938. **[Report on the Military Veterinary Research Laboratory of the Levant during 1938]**. [PIGOURY, L.]—*Rev. vét. milit.* **23.** 83–90.

A list is given of morbid material examined and of diseases diagnosed. Observations were made on MASTITIS, ANTHRAX, EPIZOOTIC LYMPHANGITIS, RABIES, PIROPLASMOSIS, CANINE LEISHMANIASIS, RICKETTSIASIS, SPIROCHAETOSIS, TRYPANOSOMIASIS, and SPIROCERCOSIS.

Single intradermal injection of Pasteur's second ANTHRAX vaccine continues to give excellent results. An attempt is being made to discover the frequency and distribution in the country of canine LEISHMANIASIS; of 62 dogs examined the parasite was found in one from Beirut and one from Bab (near Aleppo); relapses following apparently successful treatment may occur after a year. With the identification of *Theileria dispar* and *Th. mutans* it is now known that four pathogenic piroplasms of the ox exist in the Levant. A 6-month-old dog in Beirut was found to be infected with RICKETTSIA; about half the dogs there over four years old harbour *Spirocerca sanguinolenta*. AVIAN SPIROCHAETOSIS appears every autumn; an injection of the pentavalent and trivalent arsenicals singly or together exerts a prophylactic action for four to six weeks. A study of *Tryp. evansi* as it occurs in Syria has been carried out on laboratory animals and on horses. In the latter, the symptoms produced are said to resemble closely those of infectious anaemia.

—G. WILLIAMSON.

## BOOK REVIEW

CLUVER, E. H. (1939). **Public Health in South Africa.** pp. 342. Numerous figs., tables, 1 plan. Johannesburg: Central News Agency. [8vo] [25s.]

This book gives an excellent account of public health in the Union of South Africa and is of great value to all concerned with that country.

The special conditions of South Africa and the factors which affect all aspects of public health are described. Climate, water supplies, food supplies, nutritional levels, infective diseases and parasites, are dealt with in great detail as also are public health legislation, vital statistics, industrial hygiene, the control of therapeutic substances and a host of other cognate subjects.

Of special interest to veterinary readers may be instanced food poisoning, refuse disposal, and the chapters dealing with certain diseases such as TB., rabies and parasitic diseases. The article on rabies is particularly valuable in view of the spread of the disease by the mongoose and genet cat, good illustrations of these animals being given.—W. A. P.

# INDEX VETERINARIUS

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No. 2.—Issued June. Indexing period previous July—December.

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